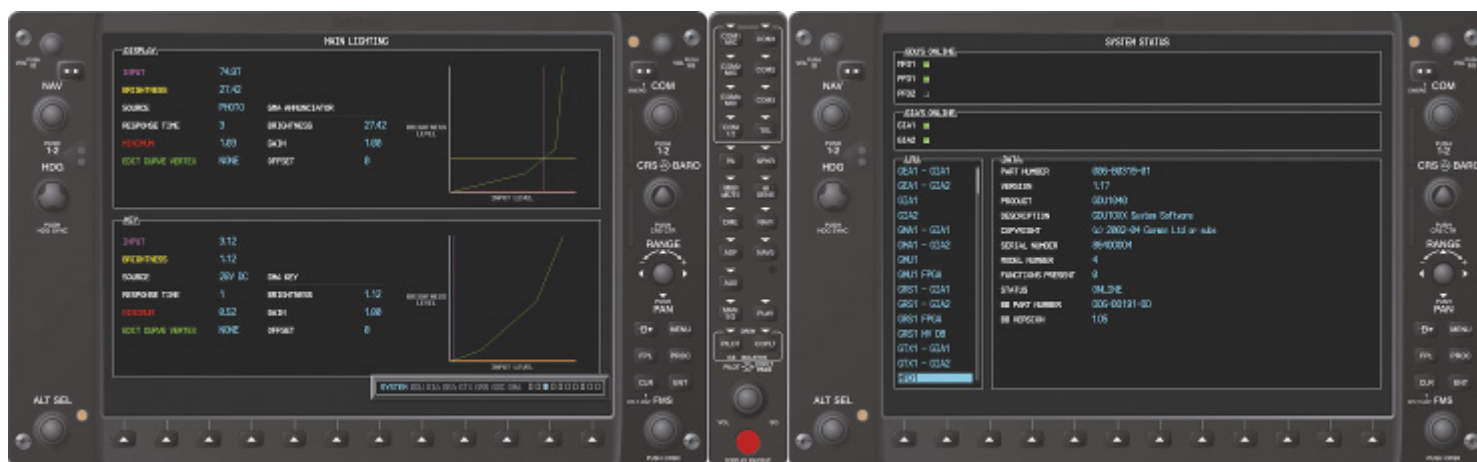


# G1000 System Maintenance Manual

## Diamond DA 40 & DA 40 F Including GFC 700 or KAP 140 AFCS

Contains FAA-Accepted Instructions  
For Continued Airworthiness For  
STC SA01444WI-D



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#### **RECORD OF REVISIONS**

| <b>Revision</b> | <b>Revision Date</b> | <b>Description</b>                                                                                                          | <b>ECO #</b> |
|-----------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------|
| B               | 1/03/2008            | Update for Phase 7: Add KAP 140 alignment & update FAR 91.411 & Appendix E testing. General updates throughout where noted. | 51022        |
| C               | 3/28/2008            | Update for minor change to STC                                                                                              | 52069        |
| D               | 4/8/2008             | Update for minor change to STC to add software 0321.19.                                                                     | 52347        |
| E               | 5/04/09              | Update for major change to STC to add software 0321.22                                                                      | 58693        |
| F               | 11/12/10             | Add Clarification to fuel probe re-calibration procedures.                                                                  | 76686        |
| G               | 2/14/13              | Update for major change to STC to add software 0321.23 and hardware upgrades.                                               | 99113        |

#### **DOCUMENT PAGINATION**

| <b>Section</b>    | <b>Pagination</b> |
|-------------------|-------------------|
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The following are **General Safety Precautions** that are not related to any specific procedure and therefore do not appear elsewhere in this maintenance manual. These are recommended precautions that personnel should understand and apply during the many phases of maintenance and repair.

**KEEP AWAY FROM LIVE CIRCUITS.** Maintenance personnel shall observe all safety regulations at all times. Turn off system power before making or breaking electrical connections. Regard any exposed connector, terminal board, or circuit board as a possible shock hazard. Components which retain a charge shall be discharged only when such grounding does not result in equipment damage. If a test connection to energized equipment is required, make the test equipment ground connection before probing the voltage or signal to be tested.

### **INFORMATION SUBJECT TO EXPORT CONTROL LAWS**

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#### **WARNING!**

This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This Notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to our web site at [www.garmin.com/prop65](http://www.garmin.com/prop65).

#### **WARNING!**

The GDU 104X lamps contain mercury and must be recycled or disposed of according to local, state, or federal laws. If you have any questions or would like additional information, please refer to our web site at [www.garmin.com/aboutGarmin/environment/disposal.jsp](http://www.garmin.com/aboutGarmin/environment/disposal.jsp).

#### **CAUTION**

The GDU 1040s use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes and abrasive cleaners. **CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING.** It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.

#### **NOTE**

All G1000 screen shots used in this document are current at the time of publication. Screen shots are intended to provide visual reference only. All information depicted in screen shots, including software file names, versions and part numbers, is subject to change and may not be up to date.

#### **NOTE**

The LRU serial numbers displayed on the screen are for convenience only and should be disregarded in determining the LRU software revision. For compliance activities requiring LRU serial number determination, the unit serial number used must be that on the physical LRU label, not the one displayed on the SYSTEM STATUS page.

#### **NOTE**

All references to Diamond DA 40 aircraft made in this manual equally apply to Diamond DA 40 F aircraft, unless otherwise noted.

#### **NOTE**

All references to GIA 63 LRUs made in this manual equally apply to GIA 63W LRUs unless otherwise noted.

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# 1 INTRODUCTION

## 1.1 Content, Scope, Purpose

This document provides Instructions for Continued Airworthiness (ICA) for the Garmin G1000 integrated avionics and GFC700 Automatic Flight Control System (AFCS) as installed in the Diamond Model DA 40 and DA 40 F. This document satisfies the requirements for continued airworthiness as defined by 14 CFR Part 23.1529 and Appendix G. Information in this document is required to maintain the continued airworthiness of the G1000 and GFC700.

### 1.1.1 Applicability

This document applies to all Diamond Aircraft Industries, Inc., Model DA 40 and DA 40 F aircraft equipped with the G1000 and optional GFC700 AFCS system under this STC.

Modification of an aircraft by this Supplemental Type Certificate (STC) obligates the aircraft operator to include the maintenance information provided by this document in the operator's Aircraft Maintenance Manual and the operator's Aircraft Scheduled Maintenance Program.

This System Maintenance manual and the contained Instructions for Continued Airworthiness supersedes all previous system maintenance manuals and ICAs, including the following Garmin documents:

- 190-00303-03
- 190-00492-01
- 190-00492-03
- 190-00545-00

#### **NOTE**

Differences in software versions that affect the maintenance manual content will be indicated within the procedures as needed. If no indication of software version is provided for the procedure or step then it is understood to apply to all software versions.

### 1.1.2 Identifying an MDL Configuration

There are six approved configurations within this STC, each defined as a subset of the Master Drawing List (MDL). Each configuration differs in both hardware and software installation requirements.

Refer to the MDL, Garmin document 005-00400-01 for each configuration type design definition.

**Table 1-1. MDL Configurations Summary**

| MDL Configuration | Aircraft System           | Upgrades Available                                                                                                                                                                                                                                                                                                                                                                                      | G1000 System Software Version |
|-------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| -1 Configuration  | G1000 & GFC 700 with WAAS | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"><li>• G1000 &amp; GFC 700 AFCS</li><li>• WAAS</li><li>• Coupled baro-VNAV</li><li>• GDU Charts</li><li>• Misc. GDU v8.02 features</li></ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"><li>GDU 1044 MFD Optional</li><li>GIA 63W Integrated Avionics (qty 2)</li><li>GA35 GPS/WAAS antennas (qty 2)</li></ul> | 0369.13                       |
|                   |                           | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"><li>• Misc. GDU v8.20 features</li></ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"><li>GIA 63W P/N 011-01105-01</li><li>GDC 74A P/N 011-00882-10</li></ul>                                                                                                                                                   | 0321.17                       |
|                   |                           | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"><li>• Misc. GDU v9.01 features</li></ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"><li>None</li></ul>                                                                                                                                                                                                        | 0321.18                       |
|                   |                           | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"><li>• Misc. GDU v9.01 features (Non WAAS Support)</li></ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"><li>None</li></ul>                                                                                                                                                                                     | 0321.19                       |
|                   |                           | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"><li>• Import Flt Plans from SD Card</li><li>• Temporary Waypoints</li><li>• Flight Data Logging to SD Card</li><li>• GDL69 Aviator Pro features</li><li>• Misc. GDU v9.15 features</li></ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"><li>None</li></ul>                                                    | 0321.22                       |

**Table 1-1. MDL Configurations Summary (Cont.)**

| <b>MDL Configuration</b> | <b>Aircraft System</b>       | <b>Upgrades Available</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>G1000 System Software Version</b> |
|--------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| -1 Configuration (Cont)  | G1000 & GFC 700 with WAAS    | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Optional Electronic Stability &amp; Protection</li> <li>• Optional GDL 59 /GSR 56B to include WWWx, SMS Text Messaging and TEL functionality</li> <li>• Optional GSR 56B standalone to include WWWx, SMS Text Messaging and TEL functionality</li> <li>• Addition of Profile View</li> <li>• Addition of Synthetic Vision (SVS)</li> <li>• Addition of Enhanced Search and Rescue (SAR)</li> <li>• Add optional installation of GSA 81 -20 servos and GSM 86 servo mounts.</li> <li>• Automated Slip Clutch Test for GSM 86 Installations</li> <li>• Misc. GDU v12.05 features</li> </ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"> <li>• GDU 1040 P/N 011-00972-10</li> <li>• GDU 1042 P/N 011-01080-10</li> <li>• GDU 1044 P/N 011-01078-10</li> <li>• GIA63W P/N 011-01105-20</li> <li>• GMU44 P/N 011-00870-10</li> <li>• GDL59 P/N 011-01746-00</li> <li>• GSR56 P/N 011-02268-00</li> <li>• GSM86 P/N 011-01904-03</li> <li>• GSA81 P/N 011-00878-20</li> </ul> | 0321.23                              |
| -2 Configuration         | G1000 & GFC 700 without WAAS | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• G1000 &amp; GFC 700 AFCS</li> <li>• Coupled baro-VNAV</li> <li>• GDU Charts</li> <li>• Misc. GDU v8.02 features</li> </ul> <b><u>Hardware Added</u></b><br>GDU 1044 MFD Optional                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0369.13                              |
|                          |                              | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Misc. GDU v8.20 features</li> </ul> <b><u>Hardware Added</u></b><br>GDC 74A P/N 011-00882-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0321.17                              |
|                          |                              | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features (Non WAAS Support)</li> </ul> <b><u>Hardware Added</u></b><br>None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0321.19                              |
|                          |                              | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Import Flt Plans from SD Card</li> <li>• Temporary Waypoints</li> <li>• Flight Data Logging to SD Card</li> <li>• GDL69 Aviator Pro features</li> <li>• Misc. GDU v9.15 features</li> </ul> <b><u>Hardware Added</u></b><br>None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0321.22                              |
|                          |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                      |

**Table 1-1. MDL Configurations Summary (Cont.)**

| MDL Configuration | Aircraft System         | Upgrades Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | G1000 System Software Version |
|-------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| -3 Configuration  | G1000 with WAAS & No AP | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• WAAS</li> <li>• GDU Charts</li> <li>• Misc. GDU v8.02 features</li> </ul> <b>Hardware Added</b><br>GIA 63W Integrated Avionics (qty 2)<br>GA35 GPS/WAAS antennas (qty 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0369.13                       |
|                   |                         | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v8.20 features</li> </ul> <b>Hardware Added</b><br>GIA 63W P/N 011-01105-01<br>GDC 74A P/N 011-00882-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0321.17                       |
|                   |                         | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features</li> </ul> <b>Hardware Added</b><br>None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0321.18                       |
|                   |                         | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features (Non WAAS Support)</li> </ul> <b>Hardware Added</b><br>None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0321.19                       |
|                   |                         | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Import Flt Plans from SD Card</li> <li>• Temporary Waypoints</li> <li>• Flight Data Logging to SD Card</li> <li>• GDL69 Aviator Pro features</li> <li>• Misc. GDU v9.15 features</li> </ul> <b>Hardware Added</b><br>None                                                                                                                                                                                                                                                                                                                                                                                                  | 0321.22                       |
|                   |                         | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Optional GDL 59 /GSR 56B to include WWWx, SMS Text Messaging and TEL functionality</li> <li>• Optional GSR 56B standalone to include WWWx, SMS Text Messaging and TEL functionality</li> <li>• Addition of Profile View</li> <li>• Addition of Synthetic Vision (SVS)</li> <li>• Addition of Enhanced Search and Rescue (SAR)</li> <li>• Misc. GDU v12.05 features</li> </ul> <b>Hardware Added</b> <ul style="list-style-type: none"> <li>• GDU 1040 P/N 011-00972-10</li> <li>• GIA63W P/N 011-01105-20</li> <li>• GMU44 P/N 011-00870-10</li> <li>• GDL59 P/N 011-01746-00</li> <li>• GSR56 P/N 011-02268-00</li> </ul> | 0321.23                       |

**Table 1-1. MDL Configurations Summary (Cont.)**

| MDL Configuration | Aircraft System                     | Upgrades Available                                                                                                                                                                                                                                                                              | G1000 System Software Version |
|-------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| -4 Configuration  | G1000 without WAAS & No AP          | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• GDU Charts</li> <li>• Misc. GDU v8.02 features</li> </ul> <b>Hardware Added</b><br>GDU 1044 MFD Optional                                                                                                                  | 0369.13                       |
|                   |                                     | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v8.20 features</li> </ul> <b>Hardware Added</b><br>GDC 74A P/N 011-00882-10                                                                                                                                     | 0321.17                       |
|                   |                                     | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features (Non WAAS Support)</li> </ul> <b>Hardware Added</b><br>None                                                                                                                                      | 0321.19                       |
|                   |                                     | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Import Flt Plans from SD Card</li> <li>• Temporary Waypoints</li> <li>• Flight Data Logging to SD Card</li> <li>• GDL69 Aviator Pro features</li> <li>• Misc. GDU v9.15 features</li> </ul> <b>Hardware Added</b><br>None | 0321.22                       |
| -5 Configuration  | G1000 with WAAS & Honeywell KAP 140 | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v8.20 features</li> </ul> <b>Hardware Added</b><br>GIA 63W P/N 011-01105-01<br>GDC 74A P/N 011-00882-10                                                                                                         | 0321.17                       |
|                   |                                     | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features</li> </ul> <b>Hardware Added</b><br>None                                                                                                                                                         | 0321.18                       |
|                   |                                     | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features (Non WAAS Support)</li> </ul> <b>Hardware Added</b><br>None                                                                                                                                      | 0321.19                       |
|                   |                                     | <b>Major Functions Added</b> <ul style="list-style-type: none"> <li>• Import Flt Plans from SD Card</li> <li>• Temporary Waypoints</li> <li>• Flight Data Logging to SD Card</li> <li>• GDL69 Aviator Pro features</li> <li>• Misc. GDU v9.15 features</li> </ul> <b>Hardware Added</b><br>None | 0321.22                       |

**Table 1-1. MDL Configurations Summary (Cont.)**

| <b>MDL Configuration</b> | <b>Aircraft System</b>                 | <b>Upgrades Available</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>G1000 System Software Version</b> |
|--------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| -5 Configuration (Cont)  | G1000 with WAAS & Honeywell KAP 140    | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Optional GDL 59 /GSR 56B to include WWWx, SMS Text Messaging and TEL functionality</li> <li>• Optional GSR 56B standalone to include WWWx, SMS Text Messaging and TEL functionality</li> <li>• Addition of Profile View</li> <li>• Addition of Synthetic Vision (SVS)</li> <li>• Addition of Enhanced Search and Rescue (SAR)</li> <li>• Misc. GDU v12.05 features</li> </ul> <b><u>Hardware Added</u></b> <ul style="list-style-type: none"> <li>• GDU 1040 P/N 011-00972-10</li> <li>• GIA63W P/N 011-01105-20</li> <li>• GMU44 P/N 011-00870-10</li> <li>• GDL59 P/N 011-01746-00</li> <li>• GSR56 P/N 011-02268-00</li> </ul> | 0321.23                              |
| -6 Configuration         | G1000 without WAAS & Honeywell KAP 140 | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Misc. GDU v8.20 features</li> </ul> <b><u>Hardware Added</u></b><br>GDC 74A P/N 011-00882-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0321.17                              |
|                          |                                        | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Misc. GDU v9.01 features (Non WAAS Support)</li> </ul> <b><u>Hardware Added</u></b><br>None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0321.19                              |
|                          |                                        | <b><u>Major Functions Added</u></b> <ul style="list-style-type: none"> <li>• Import Flt Plans from SD Card</li> <li>• Temporary Waypoints</li> <li>• Flight Data Logging to SD Card</li> <li>• GDL69 Aviator Pro features</li> <li>• Misc. GDU v9.15 features</li> </ul> <b><u>Hardware Added</u></b><br>None                                                                                                                                                                                                                                                                                                                                                                                                  | 0321.22                              |

---

## **IMPORTANT!**

**If the technician is unsure of the G1000 MDL configuration, perform the following steps:**

### **Check System Software Version**

1. Power on the G1000 system by turning on the BAT master switch, then the AVIONICS MASTER switch.
2. On the MFD power-up page, the G1000 system software version is displayed in the upper right corner in the following format:

Diamond DA40 System XXXX.XX

-or-

Diamond DA40F System XXXX.XX

The system software version is also displayed at the AUX – SYSTEM STATUS page in the upper right corner.

3. This system software version is the primary identifier of which G1000/GFC700 configuration is installed. Refer to Table 1-1 for approved G1000 system software versions.

### **NOTE**

The approved G1000 system software versions for this STC are listed in Table 1-1. If the system software version differs from that shown in Table 1-1, investigate further to determine which G1000 configuration is installed. Refer to the appropriate G1000/GFC700 System Maintenance manual (see list of superseded manuals which may apply in Section 1.1.1).

### **Check for GFC 700 AFCS Installation**

To verify whether the GFC 700 AFCS is installed, do the following:

1. Check the G1000 MFD for dedicated AFCS mode control keys on the left side of the display (see Figure 3-2).
2. Check the aircraft throttle lever for installation of a 'Go Around' (GA) button.
3. If the aircraft has these features installed, it is equipped with the Garmin GFC 700 autopilot.
4. The aircraft is either a -1 or a -2 MDL Configuration.

### **Check for WAAS Installation**

To verify whether WAAS is installed, do the following:

1. On the MFD, go to the AUX – GPS STATUS page.
2. Check to see whether a softkey labeled SBAS is displayed. The SBAS softkey only appears if the G1000 is equipped with GIA 63Ws.
3. If the SBAS softkey is present, the aircraft is a -1, -3, or a -5 MDL Configuration.

---

### Check for Optional Installations

Identify all installation options currently installed on the aircraft which interface to the G1000 and check each that applies in the following list. These options may need to be re-configured if a new system software version is loaded or an LRU is removed or replaced.

#### DA40 / DA40 F:

- ☐ ADF
- ☐ DME
- ☐ GDL 69
- ☐ Extended Range Fuel Tanks
- ☐ Standard GFC 700
- ☐ Enhanced GFC 700
- ☐ Electronic Stability and Protection (ESP)
- ☐ No Autopilot Installed (No KAP140 or GFC 700)
- ☐ EASA Airspeed Tape (EASA Registered Aircraft Only)
- ☐ Display of Fuel Pressure Gauge
- ☐ TAWS
- ☐ ChartView
- ☐ Enhanced Search and Rescue (SAR)
- ☐ Synthetic Vision and Pathway (SVS)
- ☐ GDL 59 Data Link & GSR 56 Satellite Receiver
- ☐ Standalone GSR 56 Satellite Receiver

#### DA40 F Only:

- ☐ Fuel Pressure Sensor Installed
- ☐ One CHT and EGT sensor installed
- ☐ Four CHT and EGT sensors installed

The following are provisional options not certified by any Garmin STC. To enable these interfaces, a separate installation approval is required.

- ☐ Avidyne TAS 600
- ☐ WX500 Stormscope
- ☐ CO Guardian

---

## 1.2 Organization

The following outline briefly describes the organization of this manual:

Section 2: System Description

Provides a complete description of the type design change associated with installing the G1000 integrated cockpit system in the Diamond DA 40. An overview of the G1000 and GFC 700 system interface is also provided.

Section 3: G1000 Control & Operation

Presents basic control and operation information specifically tailored to maintenance practices. Basic G1000 Configuration Mode operation is also described.

Section 4: G1000 Instructions for Continued Airworthiness

FAA-Approved Instructions for Continued Airworthiness provides airworthiness limitations and scheduled maintenance requirements for the G1000 and GFC 700 systems.

Section 5: Troubleshooting

Provides troubleshooting information to aid in diagnosing and resolving potential problems with the G1000 and GFC 700 systems.

Section 6: G1000 Equipment Removal & Replacement

Gives instructions for the removal and replacement of G1000 and GFC700 equipment.

Section 7: G1000 Equipment Configuration & Testing

Gives instructions for loading software, configuring, and testing of G1000 equipment.

Section 8: System Return to Service Procedure

Specifies return-to-service procedures to be performed upon completion of maintenance of the G1000 system.

---

### 1.3 Definitions/Abbreviations

The following are some common acronyms & definitions found throughout this manual:

|       |                                          |
|-------|------------------------------------------|
| ADI:  | Attitude Display Indicator               |
| ADF:  | Automatic Direction Finder               |
| AFCS: | Automatic Flight Control System          |
| AFMS: | Airplane Flight Manual Supplement        |
| AHRS: | Attitude Heading Reference System        |
| AMM:  | Airplane Maintenance Manual              |
| CDI:  | Course Deviation Indicator               |
| CDU:  | Control Display Unit                     |
| CFR:  | Code of Federal Regulations              |
| DME:  | Distance Measuring Equipment             |
| EAU:  | Engine/Airframe Unit                     |
| EIS:  | Engine Instrumentation Systems           |
| ESP:  | Electronic Stability and Protection      |
| GA    | Go Around                                |
| GDC   | Garmin Air Data Computer                 |
| GDL:  | Garmin Data Link                         |
| GDU:  | Garmin Display Unit                      |
| GEA:  | Garmin Engine Airframe Unit              |
| GFDS: | Garmin Flight Data Service               |
| GIA:  | Garmin Integrated Avionics               |
| GMA:  | Garmin Marker Beacon & Audio Panel Unit  |
| GMU:  | Garmin Magnetometer Unit                 |
| GPS:  | Global Positioning System                |
| GRS:  | Garmin Reference System                  |
| GS:   | Glideslope                               |
| GSA:  | Garmin Servo Actuator                    |
| GSM:  | Garmin Servo Mount                       |
| GSR:  | Garmin Satellite Radio                   |
| GTX:  | Garmin Transponder                       |
| HIRF: | High Intensity Radiated Fields           |
| HSDB: | High-Speed Data Bus (Ethernet)           |
| HSI:  | Horizontal Situation Indicator           |
| IAU:  | Integrated Avionics Unit                 |
| ICA:  | Instructions for Continued Airworthiness |
| ICS:  | Inter-Com System                         |
| ILS:  | Instrument Landing System                |
| LOC:  | Localizer                                |

---

|       |                                                     |
|-------|-----------------------------------------------------|
| LPV:  | Localizer Precision with Vertical Guidance approach |
| LRU:  | Line Replaceable Unit                               |
| MET:  | Manual Electric Trim                                |
| MFD:  | Multi-Function Flight Display                       |
| OAT:  | Outside Air Temperature                             |
| OBS:  | Omni-Bearing Selector                               |
| PFD:  | Primary Flight Display                              |
| SAR   | Search and Rescue                                   |
| STC:  | Supplemental Type Certificate                       |
| SVS   | Synthetic Vision System                             |
| SW:   | Software                                            |
| TC:   | Type Certificate                                    |
| TSO:  | Technical Standard Order                            |
| TVS:  | Transient Voltage Suppressor                        |
| WAAS: | Wide Area Augmentation System                       |
| VHF:  | Very High Frequency                                 |
| VOR:  | Very High Frequency Omni-directional Range          |

### **1.3.1 Units of Measure**

Unless otherwise stated, all units of measure are English units.

## 1.4 Publications

The following documents are required by this maintenance manual to perform maintenance:

**Table 1-2. Required Documents**

| Part Number                            | Document                                                                                     |
|----------------------------------------|----------------------------------------------------------------------------------------------|
| 005-00400-01                           | STC Master Drawing List                                                                      |
| 005-00400-08                           | General Arrangement, G1000/KAP140, WAAS, Diamond DA40/40F<br>(-5 MDL Configuration)          |
| 005-00400-09                           | General Arrangement, G1000/KAP140, no WAAS, Diamond DA40/40F<br>(-6 MDL Configuration)       |
| 005-00400-10                           | General Arrangement, G1000/GFC700, WAAS, Diamond DA40/40F<br>(-1 MDL Configuration)          |
| 005-00400-11                           | General Arrangement, G1000/GFC700, no WAAS, Diamond DA40/40F<br>(-2 MDL Configuration)       |
| 005-00400-15                           | General Arrangement, G1000 Only, WAAS, Diamond DA40/40F<br>(-3 MDL Configuration)            |
| 005-00400-16                           | General Arrangement, G1000 Only, no WAAS, Diamond DA40/40F<br>(-4 MDL Configuration)         |
| 005-00400-12                           | Resistor Installation Drawing, G1000, WAAS, Diamond DA40/40F<br>(-1 & -3 MDL Configurations) |
| 005-00400-13                           | Resistor Wiring Diagram, G1000, WAAS, Diamond DA40/40F<br>(-1 & -3 MDL Configurations)       |
| 005-00400-55                           | Optional Dual Audio Path Wiring For TAWS Installations in Diamond DA40 / DA40F               |
| DA4-9231-60-01<br>OR<br>DA4-9231-60-05 | Diamond Wiring Diagram<br>(Diamond Part Number, -05 applies to GFC700 aircraft)              |
| 6.02.01                                | Diamond DA 40 Airplane Maintenance Manual (Diamond Part Number)                              |
| 005-00400-92                           | Instl,Pitch Servo,GFC700 with GSM 86, Diamond DA40/40F                                       |
| 005-00400-93                           | Instl,Pitch Trim Servo,GFC700 with GSM 86, Diamond DA40/40F                                  |
| 005-00400-94                           | Instl,Roll Servo,GFC700 with GSM 86, Diamond DA40/40F                                        |
| 005-00464-10                           | Installation Modification, G1000/GFC700, WAAS, Diamond DA40/40F                              |
| 005-00464-15                           | Installation Modification, G1000, WAAS, No Autopilot, Diamond DA40/40F                       |
| 005-00464-00                           | Installation Modification, G1000/KAP140, WAAS, Diamond DA40/40F                              |
| 005-00464-07                           | Antenna Install, GDL59/GSR56, DA40/40F                                                       |
| 005-00464-08                           | GDL59/GSR56 Install, DA40/40F                                                                |
| 005-00464-06                           | Wiring Diagram,GDL59/GSR56 in DA40/40F                                                       |
| 005-00464-12                           | Wiring Diagram, GTX 33 Relocation, Diamond DA40 / DA 40 F                                    |
| 005-00464-13                           | Wiring Routing, GTX 33 Relocation, Diamond DA40 / DA 40 F                                    |
| 190-00355-04                           | GDL 69 Series XM Satellite Radio Activation Instructions                                     |

The following design drawings are carried over from the prerequisite previously approved STCs for continued airworthiness purposes.

**IMPORTANT!**

Previous STC General Arrangement drawings, Required Equipment Lists, and hardware/software equipment lists are obsolete and are now superseded by the new General Arrangement drawings provided in Table 1-2. The following type design data still applies to previously installed equipment.

**Table 1-3. Previously Approved Type Design**

| Part Number  | Document                                                     | STC#        |
|--------------|--------------------------------------------------------------|-------------|
| 005-00304-00 | G1000 Install, Diamond DA40/40F                              | SA01254WI-D |
| 005-00336-17 | Pitch Servo Installation, GFC700 AFCS, Diamond DA40/40F      | SA01389WI   |
| 005-00336-18 | Roll Servo Installation, GFC700 AFCS, Diamond DA40/40F       |             |
| 005-00336-19 | Pitch Trim Servo Installation, GFC700 AFCS, Diamond DA40/40F |             |

The following publications are recommended to be available during maintenance activities.

**Table 1-4. Reference Publications**

| Part Number                                                                  | Document                                                                                                                                      |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 005-00304-00                                                                 | G1000 Install, Diamond DA40/40F                                                                                                               |
| 190-00492-08                                                                 | Airplane Flight Manual Supplement: G1000 Synthetic Vision And Pathways Option                                                                 |
| 190-00492-09                                                                 | Airplane Flight Manual Supplement: G1000 Electronic Stability and Protection (ESP) Option for the Diamond DA40/DA40F                          |
| 190-00492-10                                                                 | Airplane Flight Manual Supplement: G1000 Integrated Avionics System with GFC 700 Automatic Flight Control System – Diamond Model DA40 & DA40F |
| 190-00492-11                                                                 | Airplane Flight Manual Supplement: G1000 Integrated Avionics System – Diamond Model DA40 & DA40F                                              |
| 190-00492-12                                                                 | Airplane Flight Manual Supplement: G1000 Integrated Avionics System – Diamond Model DA40 & DA40F                                              |
| 190-00324-07<br>190-00324-08<br>190-00324-09<br>190-00324-10<br>190-00324-11 | G1000/GFC700 DA 40 Cockpit Reference Guide*                                                                                                   |
| 190-00355-04                                                                 | GDL 69/69A XM Satellite Radio Activation Instructions                                                                                         |
| 190-00303-72                                                                 | GSA8X/GSM85(A) Installation Manual                                                                                                            |

\*See AFMS for correct CRG P/N required.

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## 1.5 Distribution

This document is required for maintaining the continued airworthiness of aircraft equipped with this STC. Revisions to this document will be made by Garmin and will be distributed by Garmin per standard documentation revision procedures.

For the latest revision to this document, check Garmin's web site at: [www.garmin.com/](http://www.garmin.com/) and click on 'Dealer Resource Center'.

### **NOTE**

Only Garmin-authorized dealers and service centers are given access to the Dealer portion of the Web Site. If you do not have a Dealer Password, contact Garmin directly to obtain the latest revision of this document.

## 1.6 Required Materials & Equipment

The following test equipment is required to conduct and complete all post installation checkout procedures in this section (All test equipment should have current calibration records):

- ☐ A ground power unit capable of supplying 28 Vdc power to the aircraft systems and avionics.
- ☐ Outdoor line-of-site to GPS satellite signals or GPS indoor repeater.
- ☐ Outdoor line-of-site to Iridium satellite signal.
- ☐ Headset/Microphone.
- ☐ A VHF NAV/COM Test Set
- ☐ Air Data Test Set
- ☐ L-Band Multi-Function Test Set

The following materials are defined on the applicable General Arrangement Drawing (see STC MDL):

- ☐ G1000/DA40 Software Image
- ☐ SD Card,GDU10XX BB Ldr,v2.03 (May be required. Refer to Section 3.5.3)
- ☐ SD Card,G1000,GIA6X BBL 4.01(May be required. Refer to Section 3.5.7)
- ☐ SD Card,GDU10xx Supp SVS, (TRN/OBS/APT DB/SUPP/SAFE TAXI)\*
- ☐ SD Card,GDU10xx TAWS Unlock (Optional)
- ☐ SD Card,GDU10XX,Chart Unlock, Light AC (Optional)
- ☐ SD Card, GDU1XXX Enhanced AFCS Unlock (Optional)
- ☐ SD Card, G1000, Enhanced SAR Unlock (Optional)
- ☐ SD Card,GDU10xx SVS Unlock,1 PFD (Optional)

\*Terrain database cards are required by this STC. However, the newer updated cards which provide SafeTaxi and Chart capability are an optional upgrade. If these newer cards are not installed, the existing installed cards must still be used. Reference the applicable General Arrangement Drawing (see STC MDL). See the applicable General Arrangement Drawing for each configuration in Master Drawing List, 005-00400-01 for additional details.

Table 1-5 lists the loader cards used in this upgrade and is derived from the appropriate General Arrangement drawing for each configuration listed on MDL 005-00400-01. The appropriate General Arrangement drawing should be followed if any differences exist.

**Table 1-5. Loader Card to Configuration Relationship Summary**

| <b>Legend</b> |                                                               |                                                          |                  |                  |                  |                  |                  |                  |
|---------------|---------------------------------------------------------------|----------------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>R</b>      | Required                                                      |                                                          |                  |                  |                  |                  |                  |                  |
| <b>O</b>      | Optional                                                      |                                                          |                  |                  |                  |                  |                  |                  |
| <b>*</b>      | See Note 1                                                    |                                                          |                  |                  |                  |                  |                  |                  |
| <b>†</b>      | See Note 2                                                    |                                                          |                  |                  |                  |                  |                  |                  |
| <b>NA</b>     | Not Applicable                                                |                                                          |                  |                  |                  |                  |                  |                  |
| <b>Qty</b>    | <b>010 - P/N<br/>and<br/>006 - P/N<br/>(Where Applicable)</b> | <b>Description</b>                                       | <b>Config -1</b> | <b>Config -2</b> | <b>Config -3</b> | <b>Config -4</b> | <b>Config -5</b> | <b>Config -6</b> |
| 1 ea          | 010-00369-XX<br>006-B0321-XX                                  | SD Card,G1000,DA40 Ldr                                   | R                | R                | R                | R                | R                | R                |
| 2 ea          | 010-00330-43                                                  | SD Card,GDU10xx Supp SVS (TRN/OBS/APT DB/SUPP/SAFE TAXI) | R                | R                | R                | R                | R                | R                |
| 1 ea          | 010-00330-51                                                  | SD Card,GDU10xx TAWS Unlock                              | O                | O                | O                | O                | O                | O                |
| 1 ea          | 010-00330-53                                                  | SD Card,GDU10XX,Chart Unlock, Light AC                   | O                | O                | O                | O                | O                | O                |
| 1 ea          | 010-00330-02<br>006-B0874-00                                  | SD Card,GDU10XX BB Ldr,v2.03                             | *                | *                | *                | *                | *                | *                |
| 1 ea          | 010-00533-00<br>006-B0538-00                                  | SD Card,G1000,GIA6X BBL 4.01                             | †                | †                | †                | †                | †                | †                |
| 1 ea          | 010-00330-5B                                                  | SD Card, GDU1XXX Enhanced AFCS Unlock                    | O                | NA               | NA               | NA               | NA               | NA               |
| 1 ea          | 010-00330-59                                                  | SD Card, G1000, Enhanced SAR Unlock                      | O                | O                | O                | O                | O                | O                |
| 1 ea          | 010-00330-54                                                  | SD Card,GDU10xx SVS Unlock,1 PFD                         | O                | O                | O                | O                | O                | O                |

(\*) Note 1 - REQUIRED - Only if determined necessary to update GDU 104X boot block per section 3.5.3 procedures.

(†) Note 2 – REQUIRED - Only if determined necessary to update GIA 63 boot block per section 3.5.7 procedures.

The G1000/ DA40 Software Image file, Boot Block update for the GDU 104X and GIA 63 may be electronically sourced via the listed 006- P/N. through Garmin to facilitate building a boot block software SD Card. If desired, technician may purchase the Boot Block cards as a higher – level assembly produced by Garmin, defined per the 010 – P/Ns shown above.

### **NOTE**

When an option is enabled for the first time (normally at the Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate the feature in other G1000 systems. The unlock card is forever tied to the specific aircraft in which it was used for the first time. For situations where the feature must be re-activated, this card must be used. If the original G1000 feature unlock card is not available the technician may purchase the unlock cards as a higher – level assembly produced by Garmin, defined per the 010 – P/Ns shown above or contact Garmin customer support.

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## 2 SYSTEM DESCRIPTION

### 2.1 STC Requirements Overview

The -1 and -2 STC configurations require the following STCs to be installed on the aircraft prior or concurrently to the installation of this STC:

STC #SA01254WI-D          Garmin G1000 in Diamond DA40 / 40F

STC #SA01389WI          Garmin GFC 700 in Diamond DA40 / 40F

For the -3, -4, -5, and -6 configurations of this STC, only STC #SA01254WI-D is required to be installed.

Certain Diamond Optional Aircraft Modifications (OAM) are part of the initial type design requirements for the above STCs. These modifications define much of the systems and electrical design for the Garmin G1000 and GFC 700 and are installed by the Diamond factory. The following OAMs may be installed on a DA40 equipped with the G1000, depending on STC configurations:

#### DA40 & DA40F Aircraft:

|            |                                      |
|------------|--------------------------------------|
| OAM 40-226 | G1000/GFC700 Provisions              |
| OAM 40-061 | KAP 140 Autopilot (Optional)*        |
| OAM 40-068 | Essential Bus                        |
| OAM 40-073 | Slick Start System                   |
| OAM 40-082 | IFR Lightning Protection             |
| OAM 40-146 | Remote Avionics Provisions           |
| OAM 40-071 | Extended Range Fuel Tanks            |
| OAM 40-162 | G1000 with Extended Range Fuel Tanks |
| OAM 40-210 | Provisions for Becker RA3502 ADF     |
| OAM 40-211 | Provisions for Honeywell KN63 DME    |
| OAM 40-213 | Provisions for Garmin GDL 69A        |

#### DA40 Aircraft Only:

|               |                                  |
|---------------|----------------------------------|
| OAM 40-161    | G1000 Provisions with KAP 140*   |
| OAM 40-196    | G1000 Provisions without KAP 140 |
| STC #SA1840SC | Hartzell Propeller               |

#### DA40F Aircraft Only

|            |                           |
|------------|---------------------------|
| OAM 40-222 | G1000 in DA40F Provisions |
|------------|---------------------------|

\*Currently only supported by the -5 and -6 STC configurations. The KAP140 Autopilot has been certified for use with G1000 System Software version 0321.17 or later by this STC.

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## **2.2 Equipment Descriptions**

### **2.2.1 GDU 1040 PFD & GDU 1040, 1042, or 1044 MFD**

Two Garmin GDU 1040 displays are installed in the Diamond instrument panel. One is configured as a PFD and the other as a MFD (Configuration is determined by wiring harness). Both displays provide control and display of nearly all functions of the G1000 integrated cockpit system. The displays are located side-by-side with the GMA 1347 Audio Panel located in the middle. For GFC 700-equipped aircraft, the MFD is either a GDU 1042 or GDU 1044. Both are distinguished by their dedicated AFCS control keypad on the lower left bezel. The GDU 1044 has an additional VNV key which allows for coupled-VNAV descents.

Electrical power to the PFD is from the 'Essential' power bus, whereas the MFD receives power from the 'Main' power bus. Therefore, both displays power-up immediately when the aircraft master switch is turned on. To provide proper electrical bonding, beryllium copper 'finger' strips are installed on the lower lip of the display. This provides sufficient contact area to which the displays can be grounded to the airframe.

Both displays are installed in the Diamond panel using built-in ¼-turn fasteners. Each display uses an existing connector per OAM 40-161 or OAM 40-226.

Two cooling fans are also installed behind the panel for PFD and MFD cooling.

For MDL configurations -1,-3 and -5 only, this STC installation approves alternate part numbers for the displays that accept external video input and have an additional HSDB Ethernet connection. There are no mechanical or electrical interface changes needed for these new part number displays. Refer to the applicable General Arrangement Drawing listed in Table 1-2 for part number information.

#### **NOTE**

While the alternate part numbers of displays authorized by this STC include an external video input and HDSB Ethernet connection, this STC does not approve any interfaces to these ports. These ports are not configured on by this STC. Any interfaces to these ports will require activation of these ports and additional airworthiness approvals will be required.

### **2.2.2 GMA 1347 Audio Panel**

The Garmin GMA 1347 Audio Panel is a digital audio panel with integrated marker beacon receiver. The GMA 1347 provides control of all cockpit intercom/mic systems as well as NAV/COM/ILS audio. The unit also provides display reversion mode control through a large red button. Power is received from the 'Essential' bus. The unit powers up when the aircraft master switch is turned on. The GMA 1347 interfaces with the existing marker beacon antenna as well as existing mic and phone jacks.

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### 2.2.3 GIA 63 or GIA 63W Integrated Avionics Unit (2)

#### **NOTE**

For MDL configurations -1,-3 and -5 only, this STC installation approves alternate part number '-20' GIA63Ws. The installation of these units will require software version 0321.23 or later as well as mechanical and wire harness changes to relocate the GTX33 transponders (refer to Section 2.2.5). Refer to the applicable General Arrangement Drawing listed in Table 1-2 for part number and software information.

Two Garmin GIA 63 IAUs provide VHF COM, NAV, GS, and GPS navigation functions to the G1000. GIA 63W models include a GPS/WAAS engine. GIAs also serve as a communication interface to all other G1000 LRUs in the system. Both GIAs are located remotely beneath the baggage compartment in a sheetmetal enclosure. The #1 GIA is powered through the 'Essential' power bus and immediately powers up when the aircraft master switch is turned on. The #2 GIA receives power through the 'Main Avionics' bus and powers up when the avionics master switch is turned on. Both GIA 63s interface to the following equipment:

- Existing VOR/LOC/Glideslope Antenna System
- Existing VHF COM 1 & 2 Antennas
- Existing Garmin GA56 GPS1 & 2 Antennas (GIA 63 only)
- GA35 GPS/WAAS Antennas (GIA 63W only)

### 2.2.4 GEA 71 Engine/Airframe Unit

The Garmin GEA 71 Engine/Airframe Unit provides engine/airframe data to the G1000 system. Data received from transducers/sensors is processed, then sent to GIA 63, and subsequently to the GDU 1040 MFD. In display reversionary mode, engine instrumentation is displayed on the PFD as well. The GEA is located behind the instrument panel and is mounted in a vertical orientation. Power is received from the 'Essential' power bus. The GEA interfaces to the following:

- Manifold Pressure Sensor (MAP, DA 40 aircraft only)
- Oil Pressure Sensor
- Fuel Pressure Sensor
- Tachometer Sensor
- Oil Temperature Sensor
- Fuel Flow Sensor
- 4 Cylinder Head Temperature (CHT) Sensors
- 4 Exhaust Gas Temperature (EGT) Sensors
- Alternator Current Sensor
- Existing Fuel Probes
- Existing Pitot Heat System
- Existing Open Door Detection Switches
- Existing Starter Engage System

#### **NOTE**

STC SA01254WI-D provisions engine/airframe sensors for the Diamond DA 40 aircraft only. For DA 40 F aircraft with fixed-pitch propellers, all engine sensors are provisioned and installed per Diamond OAM 40-222.

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### **2.2.5 GTX 33 Mode S Transponder**

The Garmin GTX 33 provides Mode A, C, and S altitude and position reporting information to the G1000 system.

- Aircraft with GIA 63W P/N 011-01105-00 or 011 01105-01, the unit is mounted in the remote avionics enclosure below the baggage compartment.
- Aircraft with GIA 63W P/N 011-01105-20, the unit is mounted on the outboard side of the remote avionics enclosure below the baggage compartment.

Power is received from the 'Essential' bus. The GTX 33 interfaces with the existing transponder antenna.

### **2.2.6 GDC 74A Digital Air Data Computer**

The Garmin GDC 74A provides digital air data computations to the G1000 system. The unit is mounted horizontally behind the instrument panel and is fastened to a rack. Power is received from the 'Essential' bus. The GDC 74A connects to existing pitot/static ports.

### **2.2.7 OAT Probe**

The Garmin GTP 59 OAT Probe provides the GDC 74A with air temperature data. The OAT probe is mounted to the bottom starboard side of the DA 40 fuselage.

### **2.2.8 GRS 77 Attitude & Heading Reference System**

The Garmin GRS 77 AHRS provides attitude and heading information to the G1000 system. The unit is mounted remotely in the baggage compartment, to the starboard side of the remote avionics enclosure. Power is received from the 'Essential' bus. The GRS 77 interfaces with and provides power to the GMU 44 Magnetometer. The GRS 77 supplies attitude and heading information directly to the PFD, MFD, and to both GIAs.

### **2.2.9 GMU 44 Magnetometer**

The GMU 44 provides horizontal and vertical magnetic field information to the GRS 77 AHRS. This allows heading to be calculated and provides assistance during AHRS alignment. The GMU 44 is mounted beneath the starboard wing.

### **2.2.10 GDL 69A (Optional)**

The GDL 69A provides optional XM Radio weather and music entertainment through means of a dedicated satellite data link. The GDL 69A is mounted in the remote avionics enclosure. Power to the GDL 69A is received from the 'Main Avionics' bus. The GDL 69A sends weather data through the HSDB bus to the MFD, where the data link interface is controlled. Digital audio is sent directly to the GMA 1347.

### **2.2.11 Remote Avionics Enclosure**

Refer to 005-00304-00, Sheets 2 & 8:

A remote avionics enclosure allows LRUs to be inserted vertically, from above. The enclosure is also cooled with an avionics fan and duct assembly. The assembly is grounded to an existing grounding station using a field-fabricated aluminum ground strap. Two braided grounding straps are also attached to the GRS 77 rack from the enclosure. A Comant diplexer is installed on the enclosure as shown. A field-fabricated component bracket with resistors, voltage suppressors and attached wiring is fastened to the forward portion of the enclosure.

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### **2.2.12 GDL 59 Datalink (Optional)**

The GDL 59 provides the interface to an optional GSR 56 satellite datalink, which adds airborne low speed data link and voice communication capability. The GDL 59 unit interfaces to the Garmin Integrated Flight Deck via the GDL69A using HSDB. The GDL 59 is located below the baggage compartment and power is received from the Avionics bus.

### **2.2.13 GSR 56 Satellite Transceiver (Optional)**

The GSR 56 provides airborne low speed data link and voice communication capability to Garmin Integrated Flight Deck installations. The GSR 56 contains a transceiver that operates on the Iridium Satellite network. The GSR 56 interfaces directly to the GDL 59 via an RS-232 interface for the GDL 59 / GSR 56 combination option. The Standalone GSR 56 option interfaces directly to GIA #2 via an RS-232 interface. The GSR 56 is located below the baggage compartment and power is received from the Avionics bus.

## **2.3 G1000 Optional Interfaces**

Installation of all other optional equipment that interfaces to the G1000, including ADF, DME, and GDL 69A is documented by Diamond OAM factory drawings.

### **2.3.1 KAP 140 AFCS**

The Phase 7 amendment to STC SA01444WI-D adds two new installation configurations to the MDL (See Table 1-1), both of which allow for G1000 systems with GDU 8.20 and greater to interface with existing DA40 aircraft equipped with the Honeywell KAP 140 AFCS.

The G1000 interfaces to the KAP 140 by providing the following from the #2 GIA 63:

- Output of Lateral & Vertical Navigation Signals
- Output of Course Datum
- Output of Heading Datum
- Output of Encoded Altitude
- ILS Energize Discrete
- GPS Select Discrete

Additionally, the G1000 receives the following from the KAP 140:

- Pitch Trim Fail Discrete Input
- Pitch Trim Fail Aural Input

The G1000 – KAP 140 interface was included as part of the original G1000 certification under STC SA01254WI. In order to be compatible with WAAS, GDU software changes were made as part of System Software Version 0321.17 or later, which were certified as a follow-on amendment to STC SA01444WI-D.

### **2.3.2 Synthetic Vision System**

The Synthetic Vision System (SVS) provides the crew with a greater awareness of the aircraft's position relative to surrounding terrain, obstacles, and traffic (optional). SVS is an embedded software feature of the G1000 and is controlled by using PFD softkeys. Specific details on operating the SVS feature can be found in the Synthetic Vision & Pathways AFMS specified in Table 1-4.

SVS enhances situational awareness by displaying a three dimensional depiction of terrain, obstacles, and traffic in the PFD primary field of view such that their proximity to the aircraft is more easily understood during instrument scanning. The display of SVS can be turned on and off by the pilot by a dedicated softkey on the PFD.

The SVS PFD frame-of-reference is aligned with the aircraft body frame, using AHRS attitude and heading data for orientation. Accordingly, the SVS is egocentric and attitude-aligned. GPS position and GPS-derived altitude are used for the SVS position and elevation references, respectively. The SVS 3D terrain presentation is generated from a high resolution 9 arc-second terrain database image. For the SVS system to be made available by the G1000, valid attitude, heading, GPS position, and terrain databases are required.

All previous existing PFD display features are retained and drawn over the SVS. For example, airspeed, altitude, vertical speed, heading, and HSI items will remain unchanged, and will be drawn over the SVS presentation.

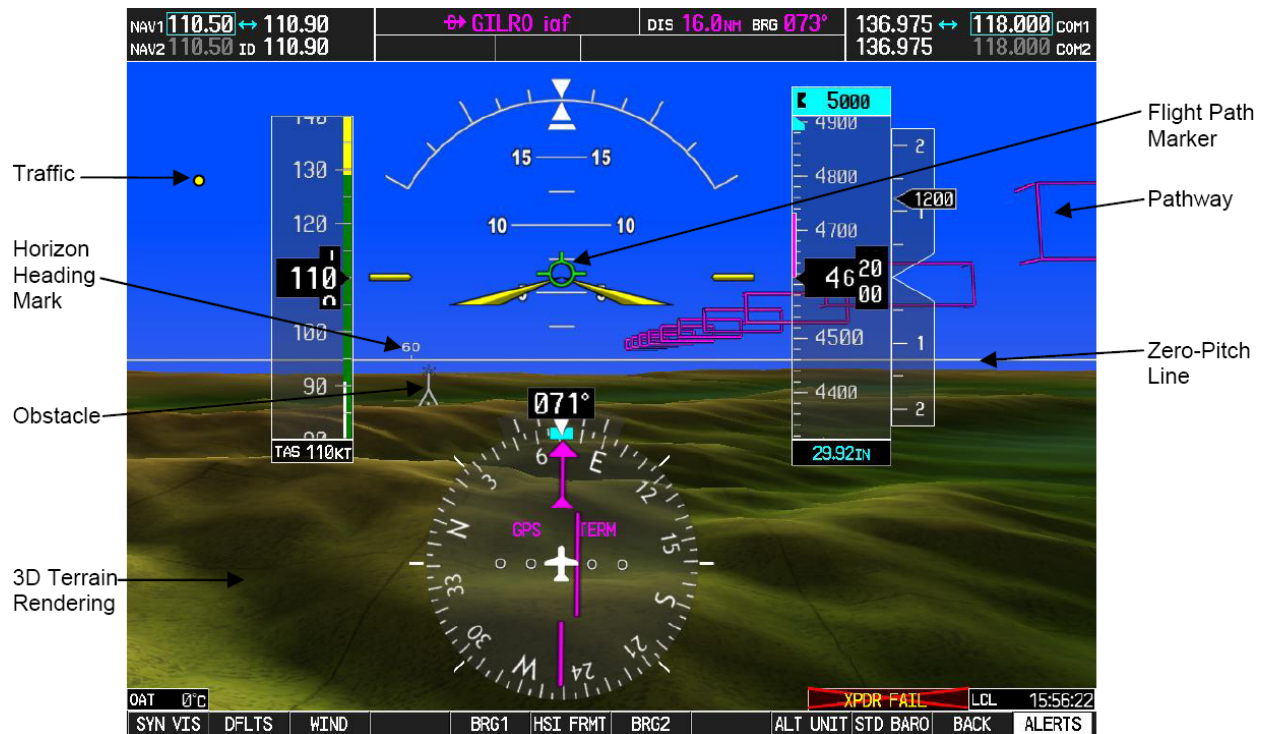


**Figure 2-1. SVS/Pathways Feature**

#### Synthetic Vision System:

3D Terrain Rendering on PFD – SVS system will utilize an egocentric, forward looking perspective of 3D terrain rendering and shading, to be displayed on the PFD.

Zero Pitch Line – The PFD displays an artificial horizon pitch reference line above the display of terrain, similar to the existing artificial horizon which currently separates the blue/brown attitude depiction. The display of horizon heading marks in 30° intervals on the pitch line is a pilot-selectable feature.

Flight Path Marker – The projected aircraft flight path is displayed in the form of a Flight Path Marker on the PFD.

Display of Traffic – Traffic data from existing certified TIS, provided by the G1000 GTX 33 Mode-S transponder, is used to generate on-screen traffic symbols.

Display of Land-based Objects – Obstacles, runways, water bodies, and other land features are displayed on the PFD.

#### Pathways:

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SVS / Pathways are a pilot-selectable feature. The display of SVS can be turned on and off by the pilot by a dedicated softkey on the PFD. The display of Pathways requires that the 3D Terrain feature be displayed (i.e. SYN TERR softkey pressed).

When active, the Pathway is displayed on the PFD and will show flight path information in the form of a virtual 3D flight path, composed of rectangular elements which form a tunnel. The depiction of this pathway is derived from the existing FMS navigation capabilities of the G1000, and the display will be consistent with that of the active flight plan shown on the MFD.

## **2.4 GFC 700 AFCS System Description**

For system software versions 0321.22 and earlier there was only one GFC 700 option which is represented by the Standard GFC 700 description listed below.

- GFC 700 - GSM 85 Servo Gearbox and GSA 81 Servo Actuator (P/N 011-00878-00)

For system software version 0321.23 and later the GFC 700 AFCS System has two (2) possible installation options.

Dependent on the desired aircraft configuration the appropriate option will be selected and loaded. The two options are listed below:

- Standard GFC 700 - GSM 85 or GSM 86 Servo Gearbox and GSA 81 Servo Actuator (P/N 011-00878-00)
- Enhanced GFC 700 – GSM 86 Servo Gearbox (P/N 011-01904-03) and GSA 81 Servo Actuator (P/N 011-00878-20)

### Enhanced GFC 700:

An option for GFC 700 with GSM 86 Servo Gearbox (P/N 011-01904-03) and GSA 81 Servo Actuator (P/N 011-00878-20) is available to the DA40 / DA40F. For this option the GSA 81 Pitch, Pitch Trim, and Roll Servos software has been introduced at version 3.11. This option was added to allow enhanced LRU and system operation and is a requirement for future GFC 700 functionality.

New functionality provided by the Enhanced GFC 700 option is as follows:

- GSM Automated Slip Clutch Torque Check
- Autopilot Expanded Engagement
- Aural AIRSPEED alert

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### Standard GFC 700:

The Standard GFC 700 with GSM 85 or GSM 86 Servo Gearbox and GSA 81 Servo Actuator (P/N 011-00878-00) is maintained as the previously certified configuration.

The Standard or Enhanced GFC 700 is a two-axis fail-safe digital flight control system that is integrated within the G1000 system. The only distinguishing hardware from a non autopilot G1000 installation is the MFD, the GSA 81 Servos and GSM 85 or GSM 86 Servo Mounts.

The following functions are provided by the GFC 700 in this installation:

- Flight Director
- Autopilot
- Manual Electric Trim

### Flight Director:

The Flight Director operates within the #1 GIA 63 and uses data from the G1000 system, including air data, attitude, and navigation data, to calculate commands for display to the pilot and for the Autopilot. Flight Director command bars and mode annunciations are sent to the PFD through a high-speed Ethernet connection for display to the pilot. The Flight Director operates independently of the Autopilot, and allows the pilot to hand-fly the command bars, if desired.

### Autopilot:

The Autopilot operates within the three GSA 81 servos. Flight Director data is processed within the three servos and turned into aircraft flight control surface commands. The Autopilot cannot operate unless the Flight Director is engaged.

### Manual Electric Trim:

Independent of the Flight Director and Autopilot, Manual Electric Trim (MET) allows the pilot to control the elevator trim tab by the MET switch located on the pilot control stick. Engaging both sides of the switch in the same direction causes the autopilot to disengage (if engaged) and drives the pitch trim servo in the desired direction. The ARM side of the MET switch may also be used to disconnect the autopilot and cancel the resulting AP DISC alerts.

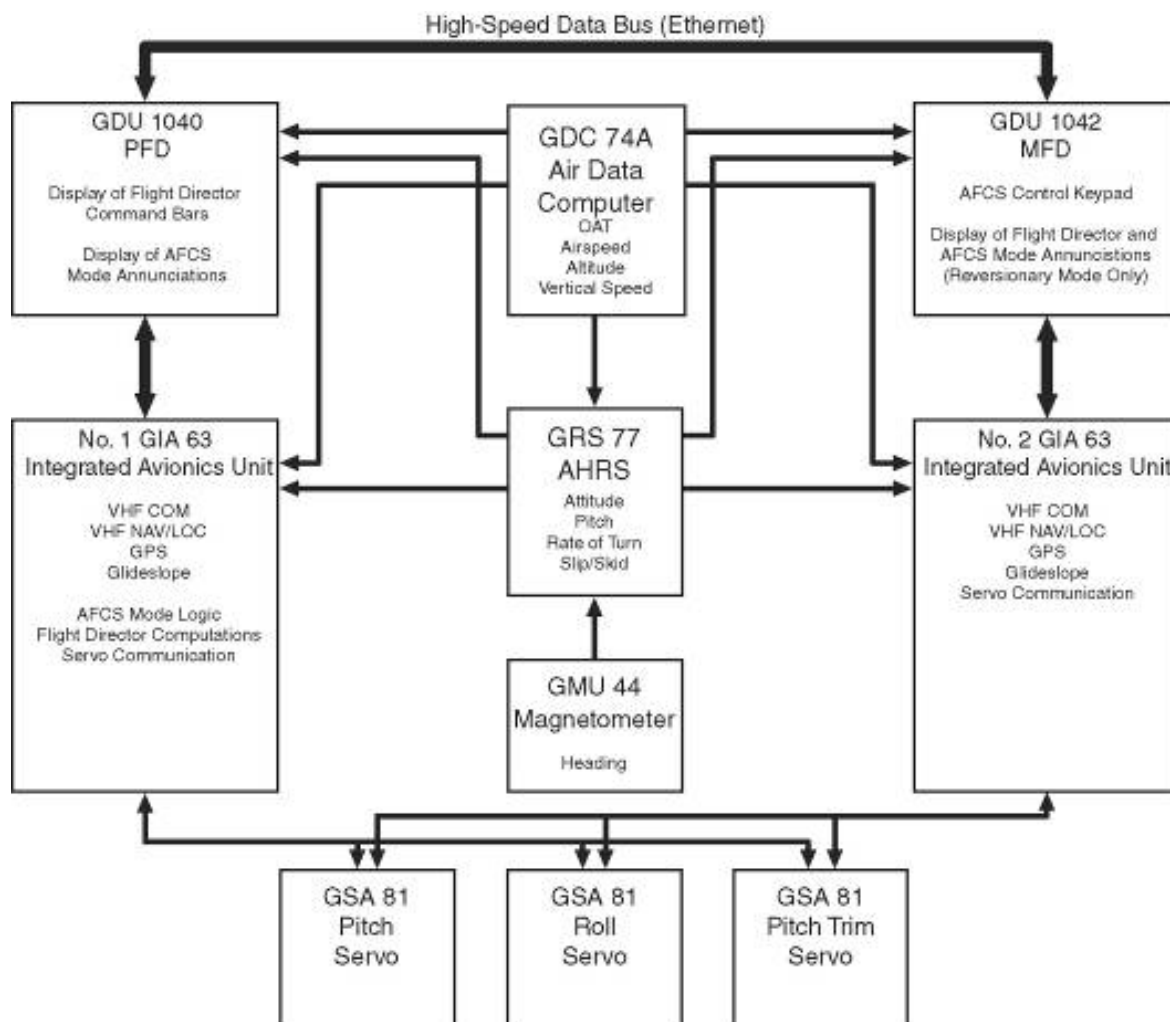


**Figure 2-2. AFCS System Block Diagram**

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### 2.4.1 GFC 700 Electrical Aspects

The wiring and switches used by the GFC 700 are provisioned by Diamond under OAM 40-226, and are not included in the Garmin GFC 700 STC design. In general, the pitch and pitch trim servos are wired in parallel to both GIA 63s and use the RS-485 serial protocol to communicate while the pitch servo has its own line to both GIAs. See the Diamond wiring diagrams listed in Table 1-2 for more details on wiring. The Diamond provisions also include the following switches:

#### AP DISC Switch

There are two large red AP DISC switches located on the pilot and copilot control sticks. When normally closed, +28 VDC is allowed to pass through to the SERVO ENABLE pins of each servo, allowing the Autopilot and servos to operate. When pushed, the switches break the +28VDC source and the Autopilot disconnects and takes the servos offline.

#### CWS Switch

A control wheel steering switch is located on the pilot's control stick. When pressed, this switch activates CWS mode. The Autopilot, if engaged, is temporarily disengaged, and the Flight Director command bars immediately synchronize to the current aircraft pitch and roll attitude. When released, the Autopilot will re-engage (if previously engaged) and the Flight Director will orient itself to the last known pitch and roll reference established during CWS mode. This allows the pilot to hand fly the aircraft when desired and also allows the pilot to reestablish a desired aircraft flight attitude for the Autopilot to maintain.

#### MET Switch

See previous functional description of MET.

#### GA Switch

A Go-Around switch is installed within the engine throttle knob and activates the GA Flight Director mode. During this mode, the Autopilot disengages (if engaged) and the Flight Director displays a 7° pitch up nose attitude for reference during a missed approach or go-around procedure.

---

## 2.4.2 GSA 81 Servo and GSM 85 or GSM 86 Servo Mount



**Figure 2-3. GSA 81 & GSM 85 or GSM 86**

The GSA 81 is mated to the GSM 85 or GSM 86 Servo Mount to form a single servo unit. There are three servo units in this installation:

- Pitch
- Pitch Trim
- Roll

The design of the servo assembly allows the servo actuator (GSA 81) to be removed from the servo mount (GSM 85 or GSM 86) without the need to de-rig the aircraft control cables. The servo mount contains the capstan (cable for roll/pitch, chain for pitch trim) and the slip clutch which allows a pilot to manually overpower the Autopilot.

The GSM 85 has a slip clutch that can be adjusted to a desired torque value. The GSM 86 has a clutch cartridge that cannot be adjusted to a different torque value.

## 2.5 Envelope Stability & Protection Description

System software version 0321.23 and later supports the optional Electronic Stability and Protection (ESP) function. ESP assists the pilot in maintaining a safe flight condition within the aircraft flight envelope, defined by pitch, roll, and airspeed. ESP is only active during flight with the autopilot off, and is only available on G1000-equipped DA40 aircraft that also have a GFC 700 autopilot with the Enhanced AFCS option installed.

ESP is automatically enabled when the aircraft exceeds one or more pre-determined thresholds beyond normal flight. ESP engages the appropriate servo(s) in protection mode with low torque and gradually increases the stick forces so the airplane naturally returns back to the desired flight envelope. The DA40 ESP activation thresholds are as follows:

- Roll threshold activation is 45 degrees for both the left and right roll conditions.
- Pitch threshold activation is 15 degrees for pitch up and 18 degrees for pitch down.
- High Airspeed threshold activation is 180 Knots Indicated Airspeed (KIAS) for high airspeed.

As the airplane deviates further from the desired flight envelope, the servo torque is increased in the direction required to return to the desired flight envelope until the maximum torque level is reached. As the airplane continues to deviate, the torque level remains constant up to the maximum engage limit.

---

Above the maximum engage limit, ESP is not provided. The maximum thresholds for deactivation of the ESP system on the Diamond DA 40 are as follows:

- Roll threshold deactivation outside of normal roll envelope is 75 degrees for both the left and right roll conditions.
- Roll threshold deactivation returning to normal roll envelope is 30 degrees for both the left and right roll conditions.
- Pitch threshold deactivation outside of normal pitch envelope is 20 degrees for pitch up and 23 degrees for pitch down.
- Pitch threshold deactivation returning to normal pitch envelope is 10 degrees for pitch up and 13 degrees pitch down.
- High Airspeed threshold deactivation occurs when the normal airspeed is 175 KIAS.

Once ESP protection is being provided and ESP is active for 50% of the last 20 seconds, the autopilot engages in LVL mode returning the aircraft to a level flight envelope. When the autopilot engages automatically an aural “ENGAGING AUTOPILOT” alert sounds and the Flight Director mode annunciations will indicate LVL for the pitch and roll modes.

The pilot can interrupt the ESP function in manual flight by pressing and holding either the Control Wheel Steering (CWS) or Autopilot Disconnect (AP DISC) switch. ESP can also be overridden by overpowering the servo’s ESP electronic torque limit.

ESP and Autopilot are mutually exclusive functions and have separate electronic torque limits for its specific function.

The pilot may also disable ESP by accessing the Multi-Function Display (MFD) Auxiliary System Setup page on the MFD and manually disabling ESP. If the MFD circuit breaker is cycled while on the ground or in flight the G1000 system will default ESP to “Enabled”. An advisory message is posted on the G1000 when ESP is disabled

---

## 2.6 Electrical Power Distribution

Distribution of power to the G1000 occurs on three buses:

Essential Bus: The 'Essential' bus is tied directly to the aircraft battery via the master switch. When the master switch is turned on, power is immediately supplied the 'Essential' bus. The 'Essential' bus is tied via a relay switch to the 'Main' aircraft bus. There are two circuit breakers on either side of the relay, combined with a single diode, allowing the battery to be charged by the alternator. Only equipment deemed essential for safe flight is connected to this bus.

Main Aircraft Bus: The 'Main' bus receives power from the aircraft battery when tied to the 'Essential' bus. After the aircraft engine is started, the alternator supplies power to the aircraft 'Main' bus, and to the rest of the system. In the event of an alternator or other power failure, the 'Essential' bus can be isolated with the 'Essential Bus' switch. This causes the 'Essential' bus to revert to battery power. Only the MFD receives power from the 'Main' bus.

Main Avionics Bus: A 'Main Avionics' bus is tied to the 'Main' aircraft bus via the 'Avionics Master' switch and switch relay. The #2 GIA 63, the ADF, DME, GFC 700 AFCS, and the GDL 69A are connected to this bus.

---

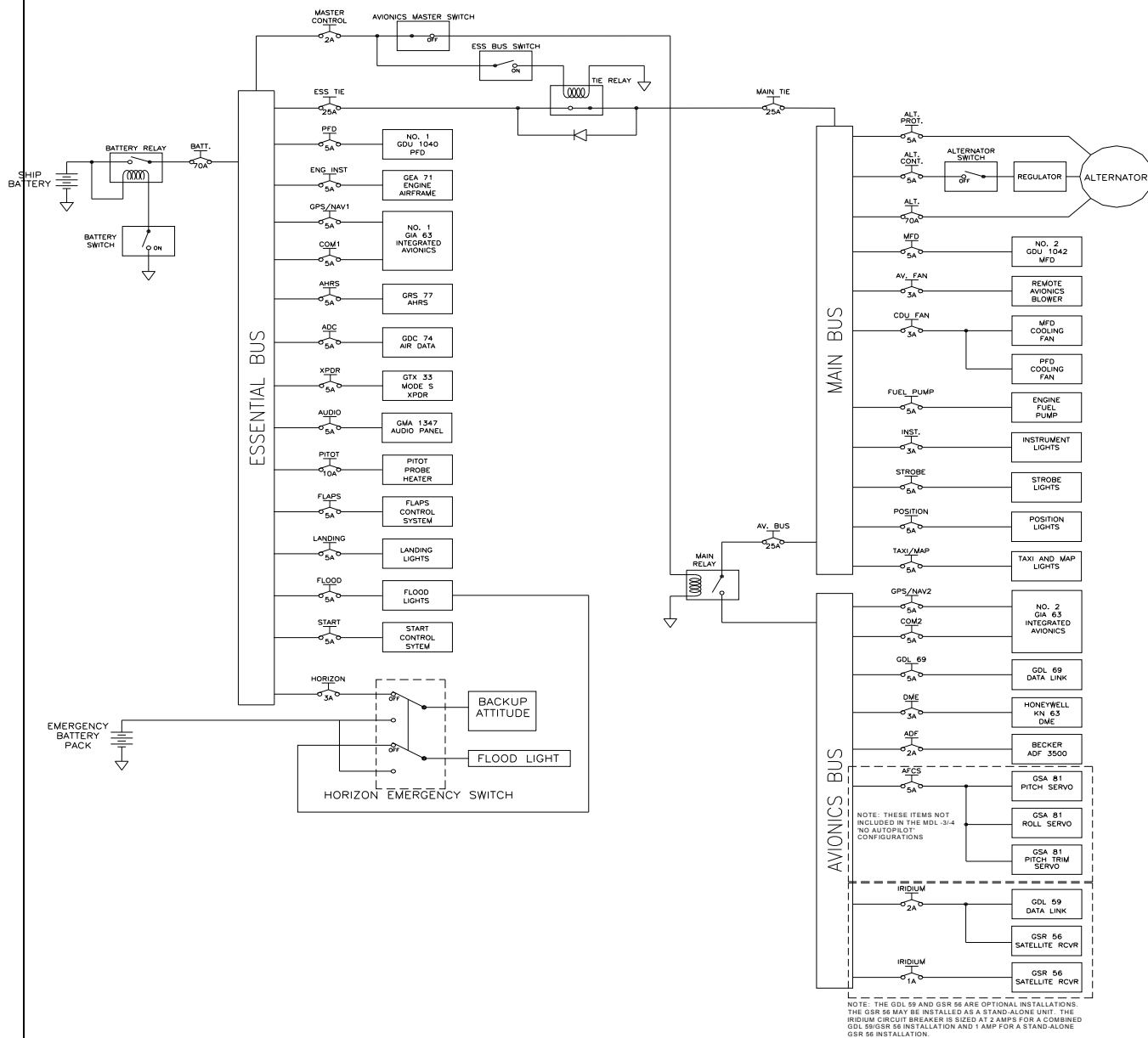


**Figure 2-4. G1000/DA40 Electrical Distribution (GFC 700 Aircraft)**



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## 2.7 Lightning Strike Protection

The following modifications to the aircraft provide additional protection of G1000 equipment from the effects of lightning strike.

### 2.7.1 Alternator / Battery Voltage Suppressors & Fuses

Refer to 005-00304-00, Sheet 5:

Two Transient Voltage Suppressors (TVS) are installed behind the instrument panel near the circuit breakers. Voltage suppressors help protect the avionics/electrical equipment against the effects of lightning strike. One voltage suppressor is connected to the load side of the aircraft battery circuit breaker, and the other is connected to the line side of the alternator circuit breaker. One 3.2 Amp slow-blow fuse is wired in line with each voltage suppressor. Fuses are easily removed by twisting the fuse holder cap counter-clockwise and removing the fuse.

### 2.7.2 GIA / AHRS Lightning Protection

Refer to 005-00304-00, Sheets 8, 10 & 11:

The GRS 77 and both GIA 63s are uniquely protected from the effects of lightning. A  $0.499\Omega$  resistor, a transient voltage suppressor, and a 3.2 Amp slow-blow fuse are used for each GIA and the AHRS. These components are installed on a field-fabricated aluminum block, which is mounted to the front of the remote avionics enclosure. Power leads for the AHRS and both GIAs are routed from the aircraft harness to a 9-pin connector (P900), whose mating connector is mounted to the fabricated block (J900). Power is returned to the LRU after passing through the resistor and voltage suppressor.

Refer to 005-00400-12:

For WAAS-equipped aircraft, seven additional resistors are installed on a sheetmetal bracket on the side of the remote avionics box. Three resistors are inline between the #1 GIA 63W and GRS 77 RS-232 serial communications line and four are inline between the #1 GIA 63W and PFD High Speed Data Bus (HSDB) cable.

### 2.7.3 Lightning Strike Maintenance

Proper electrical bonding of all metallic components is critical for the protection against the effects of lightning. Severe corrosion may inhibit a component's ability to bond to the aircraft's electrical ground plane. The following summarizes maintenance practices which are implemented to maintain adequate lightning protection for the aircraft. See Section 4, Table 4-1 for exact maintenance requirements and associated intervals:

- Annual visual inspection of all G1000 equipment, including voltage suppressors, resistors, fuses, etc.
- An electrical bonding check of G1000 equipment every 1000 hours or anytime a lightning strike occurs or is suspected.
- Regular replacement (every 24 calendar months) of all five 3.2 Amp slow-blow fuses ensures they are in fresh condition.
- Replacement of voltage suppressors, resistors, and fuses anytime a lightning strike occurs or is suspected.

## 2.8 Shield Block Grounds

Most G1000 connectors employ a Shield Block grounding system to provide necessary ground reference to wire shielding and/or transducers. The shield block termination method allows multiple grounds to be terminated directly to a block mounted to the connector backshell assembly. Refer to G1000/DA40 Install Drawing, 005-00304-00 for installation details. Note that pre-2008 G1000 installations may employ a slightly different shield grounding system called a “SPIDER” system. Note that aircraft changing from a FAA certification to an EASA certification will require changing the SPIDER grounding system to the shield block method.

## 2.9 Sensor Installations

Refer to 005-00304-00, Sheets 5, 9, & 12 for the engine sensor installation drawings.

## 2.10 Block Diagrams

### 2.10.1 G1000 & KAP140

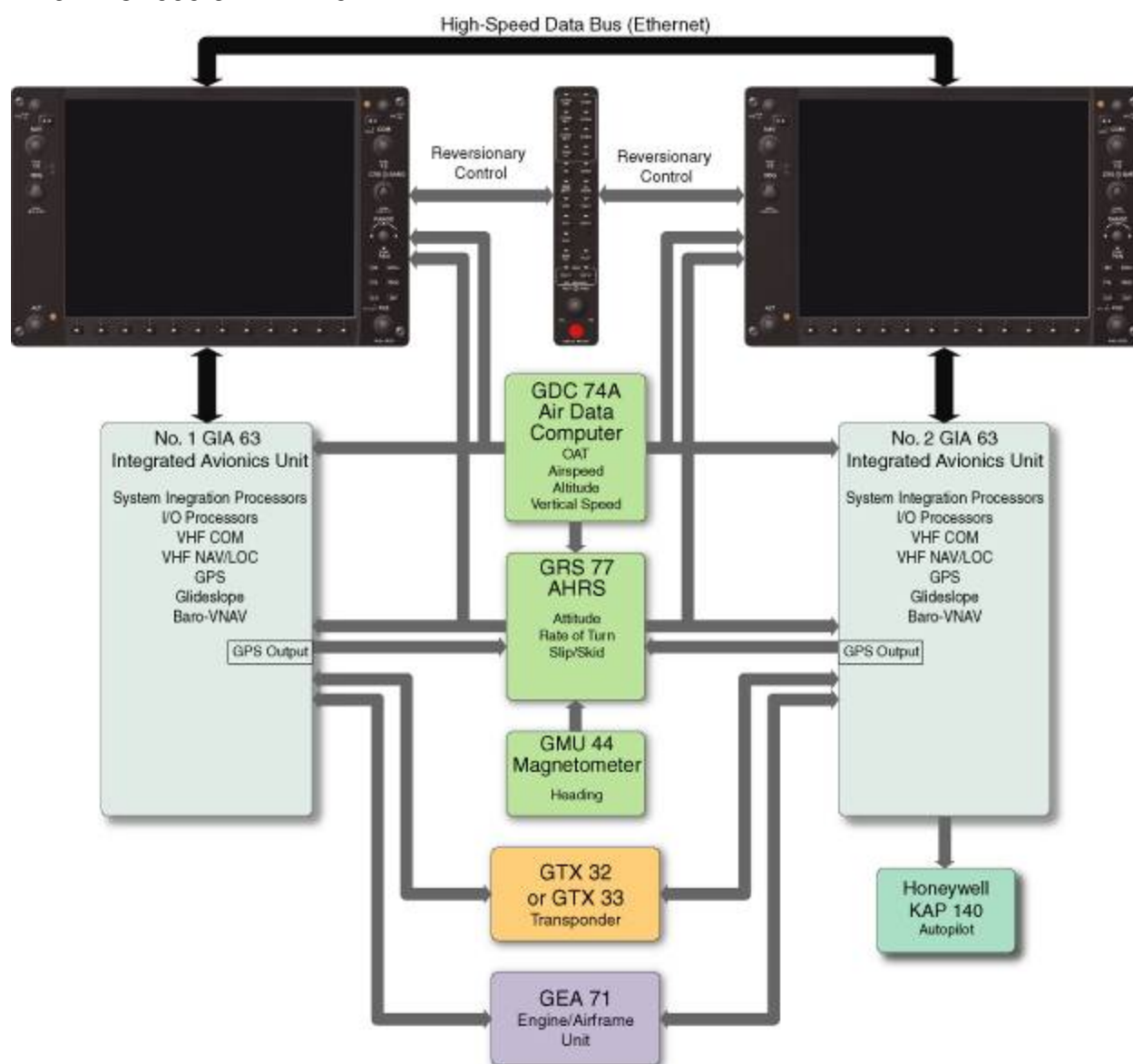


**Figure 2-6. G1000/KAP 140 Block Diagram (no WAAS)**

## 2.10.2 G1000 & GFC700

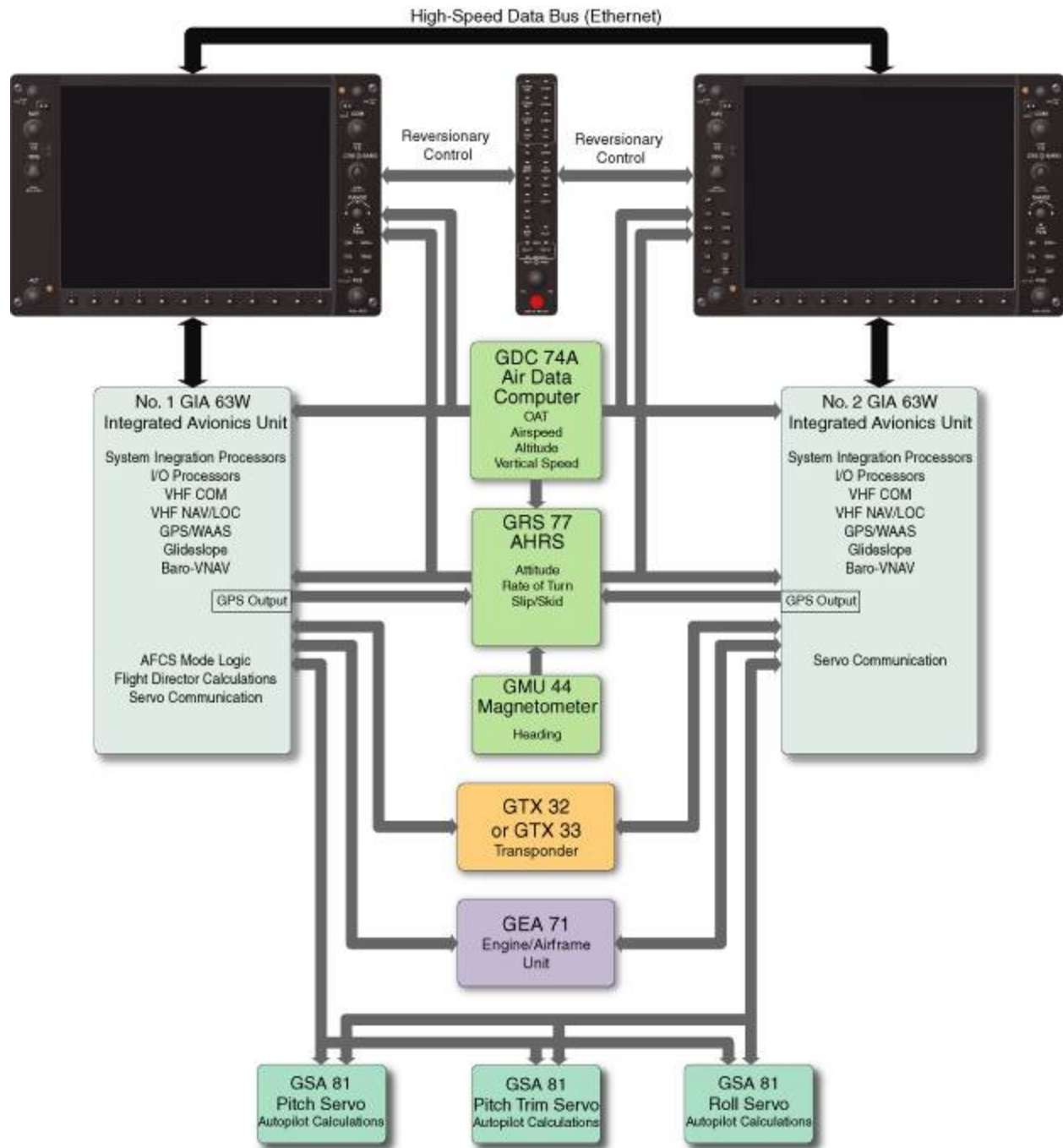


**Figure 2-7. G1000/GFC 700 Block Diagram (WAAS shown)**

### 3 G1000 Control & Operation

All control and operation of G1000 equipment as normally used in flight occurs through the PFD, MFD and GMA 1347 audio panel. Figure 3-1 identifies GDU 1040 buttons. Figure 3-3 identifies various GMA 1347 buttons.

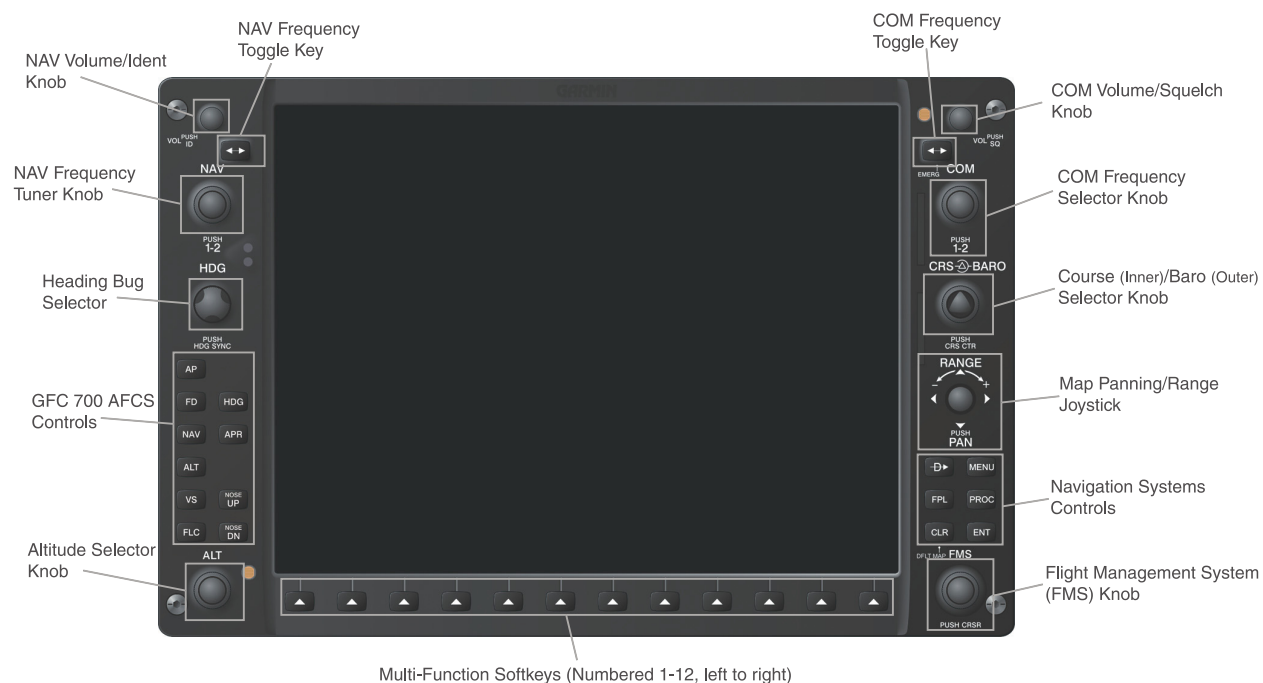


**Figure 3-1. GDU 104X Control Interface (GDU 1042 shown)**

#### 3.1.1 AFCS Controls

The dedicated AFCS controls located on the GDU 1042 and 1044 are discussed in detail in the G1000 CRG. The following figure is provided for reference:

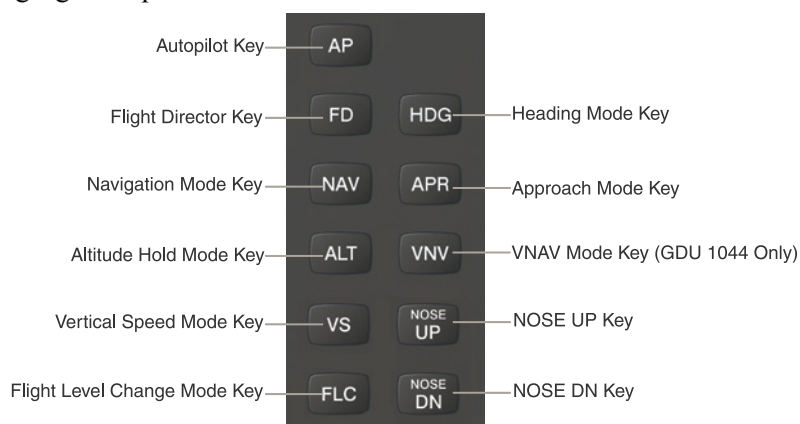


**Figure 3-2. AFCS Controls (GDU 1044 shown)**

### 3.1.2 GMA 1347 Controls

The controls located on the GMA 1347 are discussed in detail in the G1000 CRG. The following figure is provided for reference:

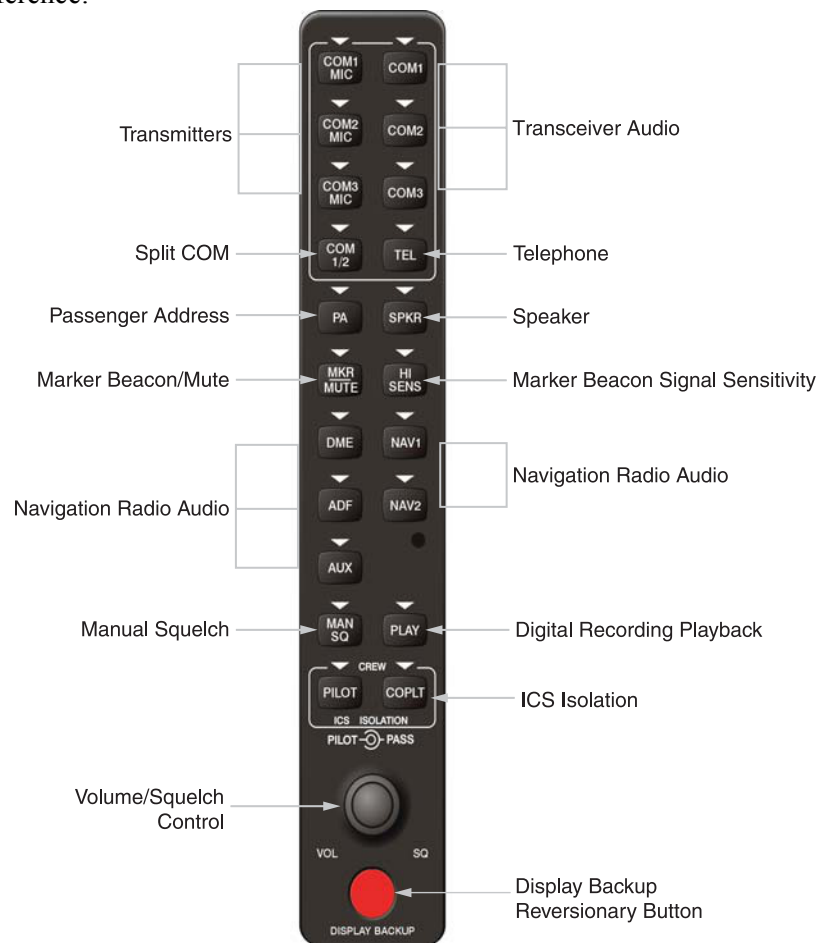


**Figure 3-3. GMA 1347 Controls**

### 3.1.3 FMS Knob

The FMS knob is the primary control for the G1000 system. Operation is similar to the Garmin 400/500 Series units.

- To cycle through different configuration screens:
  - To change page groups:* Rotate the large FMS knob.
  - To change pages in a group:* Rotate the small FMS knob.
- To activate the cursor for a page, press the small FMS knob directly in, as one would push a regular button.
- To cycle the cursor through different data fields, rotate the large FMS knob.
- To change the contents of a highlighted data field, rotate the small FMS knob. This action either brings up an options menu for the particular field, or in some cases allows the operator to enter data for the field.
- To confirm a selection, press the ENT key.
- To cancel a selection, press the small FMS knob in again, deactivating the cursor. The CLR key may also be used to cancel a selection or deactivate the cursor.

### 3.1.4 Softkeys

Some pages have commands or selections that are activated by the GDU 1040 softkeys. If a softkey is associated with a command, that command will be displayed directly above the key. A grayed-out softkey shows a command that is unavailable. A softkey that is highlighted shows the current active selection.



**Figure 3-4. G1000 Softkeys**

## 3.2 G1000 Operation Modes

### 3.2.1 Normal Mode

*To start the G1000 system in Normal Mode:*

1. Turn on the aircraft master switch. The following G1000 equipment is powered on:
  - PFD & MFD (MFD receives power only if 'Essential Bus' switch is OFF)
  - GRS 77 AHRS
  - GDC 74A Air Data Computer
  - No. 1 GIA 63 Integrated Avionics Unit
  - GEA 71 Engine/Airframe Unit
  - GTX 33 Mode S Transponder
  - GMA 1347 Digital Audio Panel
2. Turn on the DA 40 AVIONICS MASTER switch. The following G1000 equipment is powered on:
  - No. 2 GIA 63 Integrated Avionics Unit
  - GFC 700 (if equipped)
  - GDL 69A (if equipped)

The G1000 system is now powered in the normal mode. The PFD and MFD will function as specified in the G1000/DA 40 Cockpit Reference Guide, when the system has been correctly installed and configured.

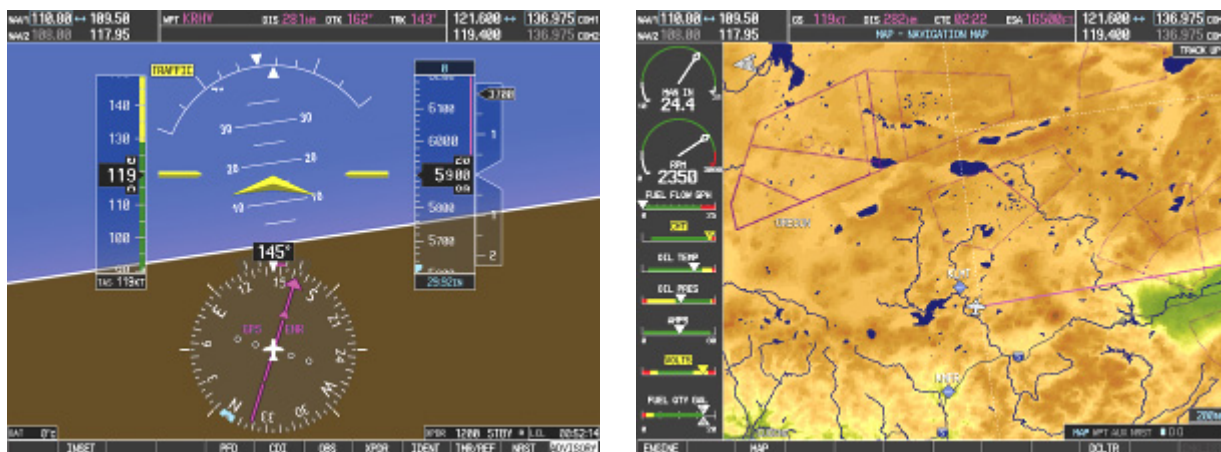


**Figure 3-5. Normal Mode**



### 3.3 G1000 Configuration Mode Overview

The Configuration Mode exists to provide the avionics technician with a means of configuring, checking, and calibrating various G1000 sub-systems. Troubleshooting and diagnostics information can also be viewed in this mode.

*To start the system in Configuration Mode:*

1. Start the system in normal mode as described in Section 3.2.1.
2. Remove power to the PFD and MFD by pulling the circuit breakers labeled PFD and MFD.
3. Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
4. Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
5. Power on the MFD in the same manner. You must have both displays in Configuration Mode whenever performing post-installation practices.

#### **NOTE**

It is good practice to cycle power to the entire G1000 system, not just the displays, anytime software loading, configuration or other maintenance procedures have been completed.

#### **CAUTION**

The Configuration Mode contains certain pages and settings that are critical to aircraft operation and safety. These pages are protected and cannot be modified, unless the technician is properly authorized and equipped. However, most protected pages are viewable to allow system awareness for troubleshooting.

#### **NOTE**

For a complete description and breakdown of each Configuration Mode page, refer to the G1000 Line Maintenance & Configuration Manual, Garmin part number 190-00303-04.

#### **NOTE**

Throughout this document when performing configuration or software uploads reference is made to two fields, "AIRFRAME" and "FILE" for software versions SW v0321.19 or earlier and "GROUP" and "ITEM" for SW v0321.22 or later. When either of these terms is referenced in this document their function is synonymous for the specific items being loaded.

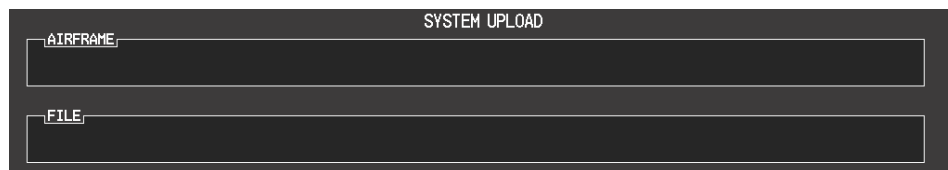


**Figure 3-8. SYSTEM UPLOAD FIELDS (SW v0321.19 or earlier)**

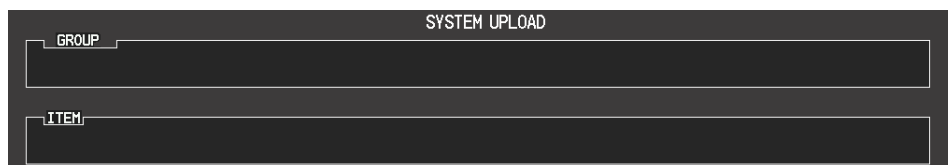


**Figure 3-9. SYSTEM UPLOAD FIELDS (SW v0321.22 or later)**

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### 3.3.1 SET>ACTV Configuration

Throughout the configuration mode pages, there are SET and ACTIVE columns for input/output settings and other parameters.

SET: Refers to a setting or group of settings that reside in PFD internal memory.

ACTIVE: Refers to a current setting stored and used in a LRU. LRUs store the ‘active’ settings within internal memory.

Data can be manually copied from one column to the other (and consequently from PFD memory to the LRU memory and vice-versa) by using the following two softkeys, when available:

- SET>ACTV (read ‘Set to Active’) softkey: Allows the technician to send the information in the SET column (data stored in PFD internal memory) to the ACTV column (data used by LRU).
- ACTV>SET (read ‘Active to Set’) softkey: Causes the LRUs current settings to be copied to PFD internal memory as SET items.

#### **CAUTION**

It is highly recommended that the ACTV>SET softkey not be used unless specifically instructed by this manual. If the ACTV>SET softkey is used it should be used with caution! If an improperly configured unit is installed, this softkey causes the wrong configuration to replace the correct aircraft configuration.

In the first example shown in Figure 3-10, the SET columns do not match the ACTIVE columns. The inequality between SET and ACTIVE indicates a configuration mismatch and triggers a configuration error message for the LRU. By pressing the SET>ACTV softkey, this copies the data shown in the SET column to the LRU unit’s internal memory. The settings then become the ACTIVE settings for the LRU being configured.

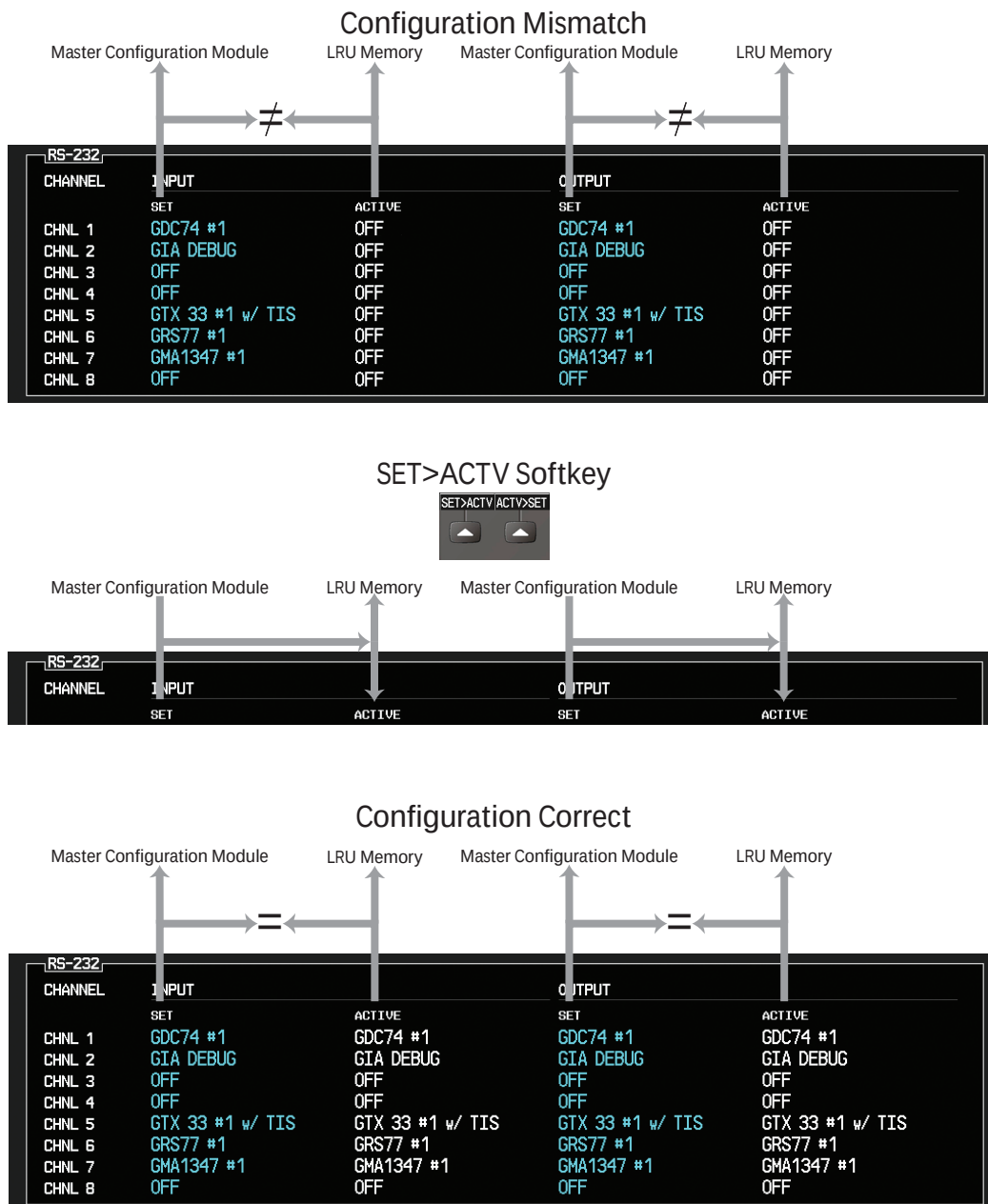


**Figure 3-10. SET>ACTV Diagram**

When troubleshooting configuration error messages, technicians can look for inequalities between SET and ACTIVE columns which trigger the message. Some configuration error messages can be resolved simply by pressing the SET>ACTV softkey, which reloads settings from the PFD to the specific LRU. This can also be accomplished by reloading the configuration files for the LRU, using the approved G1000 system software loader card for the currently installed software. Section 7 describes the process for loading configuration files from a software loader card to a LRU).

A blank active column, as shown in Figure 3-11, represents loss of communication between the display and the particular unit. See Section 5 for more details on troubleshooting loss of communications.

| RS-232  |                  |        |                  |        |
|---------|------------------|--------|------------------|--------|
| CHANNEL | INPUT            |        | OUTPUT           |        |
|         | SET              | ACTIVE | SET              | ACTIVE |
| CHNL 1  | GDC74 #1         |        | GDC74 #1         |        |
| CHNL 2  | GIA DEBUG        |        | GIA DEBUG        |        |
| CHNL 3  | OFF              |        | OFF              |        |
| CHNL 4  | OFF              |        | OFF              |        |
| CHNL 5  | GTX 33 #1 w/ TIS |        | GTX 33 #1 w/ TIS |        |
| CHNL 6  | GRS77 #1         |        | GRS77 #1         |        |
| CHNL 7  | GMA1347 #1       |        | GMA1347 #1       |        |
| CHNL 8  | OFF              |        | OFF              |        |

**Figure 3-11. Loss of Communication**

### 3.3.2 Configuration Prompts

When configuration settings are changed, the technician receives on-screen prompts and/or confirmations such as those shown in Figure 3-11. Section 7 shows other prompts encountered during the configuration process.



**Figure 3-12. Configuration Status**

### 3.3.3 Data Transmission Indicators

In addition to LRU status, indicator lights and symbols show the status of LRU/Channel data paths. This can help in identifying a fault.

**Table 3-1. Data Transmission Indicators**

| GDU Software before v0321.19                                                      |                                                                                                                                                                   | GDU Software for v0321.22 and greater                                               |                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INDICATOR                                                                         | MEANING                                                                                                                                                           | INDICATOR                                                                           | MEANING                                                                                                                                                           |
|  | The LRU is online and reports that the item located next to the indicator box is communicating.                                                                   |    | The LRU is online and reports that the item located next to the indicator box is communicating.                                                                   |
|  | The LRU is online, and reports that the item located next to the indicator box is not communicating.                                                              |    | The LRU is online, and reports that the item located next to the indicator box is not communicating.                                                              |
|  | The LRU is not reporting a status for the item located next to the indicator box. This may be because the data is not available, not applicable, or not expected. |    | The LRU is not reporting a status for the item located next to the indicator box. This may be because the data is not available, not applicable, or not expected. |
|                                                                                   |                                                                                                                                                                   |    | The LRU is not reporting status for the item located next to the indicator box. This may be due to the fact that the data is not available or is not expected.    |
|                                                                                   |                                                                                                                                                                   |   | “True” condition; i.e., necessary conditions have met in order to activate the item.                                                                              |
|                                                                                   |                                                                                                                                                                   |  | “False” condition; i.e., necessary conditions have not been met in order to activate the item.                                                                    |
|                                                                                   |                                                                                                                                                                   |  | “High” condition; i.e., the system expects a high voltage or a high resistance input to trigger the item (fan operation, etc.)                                    |
|                                                                                   |                                                                                                                                                                   |  | “Low” condition; i.e., the system expects a low voltage or a low resistance input to trigger the item (fan operation, etc.)                                       |

| SYSTEM DATA PATHS |           |        |         |           |
|-------------------|-----------|--------|---------|-----------|
| LRU               | CHANNEL   | STATUS | MONITOR | DATA PATH |
| MFD1              | IN 1      | ✗      | ON      | FAIL      |
| MFD1              | IN 2      | ✗      | ON      | FAIL      |
| GIA1              | IN 1      | ?      | OFF     | UNKNOWN   |
| GIA1              | IN 2      | ?      | OFF     | UNKNOWN   |
| GIA1              | IN 3      | ?      | OFF     | UNKNOWN   |
| GIA1              | IN 4      | ?      | OFF     | UNKNOWN   |
| GIA1              | IN 5      | ?      | OFF     | UNKNOWN   |
| GIA1              | IN 6      | ?      | ON      | UNKNOWN   |
| GIA1              | IN 7      | ?      | OFF     | UNKNOWN   |
| GIA1              | IN 8      | ?      | OFF     | UNKNOWN   |
| GIA2              | IN 1      | ?      | ON      | UNKNOWN   |
| GIA2              | IN 2      | ?      | ON      | UNKNOWN   |
| GIA2              | IN 3      | ?      | ON      | UNKNOWN   |
| GIA2              | IN 4      | ?      | OFF     | UNKNOWN   |
| GIA2              | IN 5      | ?      | ON      | UNKNOWN   |
| GIA2              | IN 6      | ?      | ON      | UNKNOWN   |
| GIA2              | IN 7      | ?      | OFF     | UNKNOWN   |
| GIA2              | IN 8      | ?      | OFF     | UNKNOWN   |
| GSD1              | A429 IN 1 | ?      | ON      | UNKNOWN   |
| GSD1              | A429 IN 2 | ?      | ON      | UNKNOWN   |
| GSD1              | A429 IN 3 | ?      | ON      | UNKNOWN   |

## DATA PATH STATUS

**Figure 3-13. Data Transmission Indicators**

### 3.3.4 Configuration Mode Navigation

Using the FMS knob as described in Section 3.1.3, a user can navigate through different pages and page groups in the Configuration Mode. For complete description and breakdown of each page, refer to the G1000 Line Maintenance & Configuration manual, Garmin part number 190-00303-04.

The active page title is displayed at the top of the screen in the center. In the bottom right corner of the screen, the current configuration page group, number of pages available in the group, and placement of the current page within the group are indicated by icons.

#### **NOTE**

Certain "protected" configuration pages are critical to aircraft operation and safety. The technician is unable to modify or change settings on these pages unless they are authorized and equipped to do so. They are viewable to aid in troubleshooting.

Page Navigation tables specific to the applicable software versions start on the next page.

---

**Table 3-2. Page Navigation SW v0321.19 or earlier**

**System Page Group**

- |                              |                         |                            |
|------------------------------|-------------------------|----------------------------|
| 1. System Status             | 5. System Upload        | 9. System Configuration    |
| 2. Date/Time Setup           | 6. Diagnostics Terminal | 10. System Setup           |
| 3. Main Lighting             | 7. Maintenance Log      | 11. Manifest Configuration |
| 4. Audio Alert Configuration | 8. OEM Diagnostics      |                            |

**GDU Page Group**

- |                                     |                        |                           |
|-------------------------------------|------------------------|---------------------------|
| 1. RS-232 / ARINC 429 Configuration | 4. Diagnostics         | 7. Alert Configuration    |
| 2. GDU Status                       | 5. Serial/Ethernet I/O | 8. Airframe Configuration |
| 3. GDU Test                         | 6. Alert Configuration |                           |

**GIA Page Group**

- |                                     |                          |               |
|-------------------------------------|--------------------------|---------------|
| 1. RS-232 / ARINC 429 Configuration | 3. GIA I/O Configuration | 5. GIA Status |
| 2. CAN / RS-485 Configuration       | 4. COM Setup             |               |

**GEA Page Group**

- |                |               |                      |
|----------------|---------------|----------------------|
| 1. Engine Data | 2. GEA Status | 3. GEA Configuration |
|----------------|---------------|----------------------|

**GTX Page Group**

- |                                     |                              |
|-------------------------------------|------------------------------|
| 1. RS-232 / ARINC 429 Configuration | 2. Transponder Configuration |
|-------------------------------------|------------------------------|

**GRS Page Group**

- |                          |                          |
|--------------------------|--------------------------|
| 1. AHRS / Air Data Input | 2. GRS / GMU Calibration |
|--------------------------|--------------------------|

**GDC Page Group**

- |                      |
|----------------------|
| 1. GDC Configuration |
|----------------------|

**GFC Page Group**

- |                       |                |
|-----------------------|----------------|
| 1. GFC Configuration* | 2. GFC Status* |
|-----------------------|----------------|

**GMA Page Group**

- |                      |
|----------------------|
| 1. GMA Configuration |
|----------------------|

**GDL Page Group**

- |                           |
|---------------------------|
| 1. GDL 69 Configuration * |
|---------------------------|

**CAL Page Group**

- |                          |                               |                     |
|--------------------------|-------------------------------|---------------------|
| 1. Fuel Tank Calibration | 2. Flaps and Trim Calibration | 3. HSCM Calibration |
|--------------------------|-------------------------------|---------------------|

\* If option is configured

---

**Table 3-3. Page Navigation SW v0321.22**

**System Page Group**

- |                              |                         |                            |
|------------------------------|-------------------------|----------------------------|
| 1. System Status             | 6. Diagnostics Terminal | 10. System Setup           |
| 2. Date/Time Setup           | 7. Maintenance Log      | 11. Manifest Configuration |
| 3. Main Lighting             | 8. OEM Diagnostics      | 12. Maintenance Log        |
| 4. Audio Alert Configuration | 9. System Configuration |                            |
| 5. System Upload             | 10. System Data Paths   |                            |

**GDU Page Group**

- |                                     |                        |                           |
|-------------------------------------|------------------------|---------------------------|
| 1. RS-232 / ARINC 429 Configuration | 4. Diagnostics         | 7. Airframe Configuration |
| 2. GDU Status                       | 5. Serial/Ethernet I/O | 8. TAWS – B Setup         |
| 3. GDU Test                         | 6. Alert Configuration |                           |

**GIA Page Group**

- |                                     |                          |                      |
|-------------------------------------|--------------------------|----------------------|
| 1. RS-232 / ARINC 429 Configuration | 3. GIA I/O Configuration | 5. GIA Status        |
| 2. RS-485 Configuration             | 4. COM Setup             | 6. CAN Configuration |

**GEA Page Group**

- |                |               |                      |
|----------------|---------------|----------------------|
| 1. Engine Data | 2. GEA Status | 3. GEA Configuration |
|----------------|---------------|----------------------|

**GTX Page Group**

- |                                     |                              |
|-------------------------------------|------------------------------|
| 1. RS-232 / ARINC 429 Configuration | 2. Transponder Configuration |
|-------------------------------------|------------------------------|

**GRS Page Group**

- |                          |                          |
|--------------------------|--------------------------|
| 1. AHRS / Air Data Input | 2. GRS / GMU Calibration |
|--------------------------|--------------------------|

**GDC Page Group**

- |                      |                      |
|----------------------|----------------------|
| 1. ADC Configuration | 2. GDC Configuration |
|----------------------|----------------------|

**GFC Page Group**

- |                       |                |
|-----------------------|----------------|
| 1. GFC Configuration* | 2. GFC Status* |
|-----------------------|----------------|

**GMA Page Group**

- |                      |
|----------------------|
| 1. GMA Configuration |
|----------------------|

**GDL Page Group**

- |             |
|-------------|
| 1. GDL 69 * |
|-------------|

**CAL Page Group**

- |                          |                               |                     |
|--------------------------|-------------------------------|---------------------|
| 1. Fuel Tank Calibration | 2. Flaps and Trim Calibration | 3. HSCM Calibration |
|--------------------------|-------------------------------|---------------------|

\* If option is configured

---

**Table 3-4. Page Navigation SW v0321.23****System Page Group**

- |                              |                         |                            |
|------------------------------|-------------------------|----------------------------|
| 1. System Status             | 6. Diagnostics Terminal | 11. Manifest Configuration |
| 2. Date/Time Setup           | 7. OEM Diagnostics      | 12. Maintenance Log        |
| 3. Main Lighting             | 8. System Configuration |                            |
| 4. Audio Alert Configuration | 9. System Data Paths    |                            |
| 5. System Upload             | 10. System Setup        |                            |

**GDU Page Group**

- |                                     |                        |                           |
|-------------------------------------|------------------------|---------------------------|
| 1. RS-232 / ARINC 429 Configuration | 4. Diagnostics         | 7. Alert Configuration    |
| 2. GDU Status                       | 5. Serial/Ethernet I/O | 8. Airframe Configuration |
| 3. GDU Test                         | 6. Video               | 9. TAWS – B Setup         |

**GIA Page Group**

- |                                     |                          |                      |
|-------------------------------------|--------------------------|----------------------|
| 1. RS-232 / ARINC 429 Configuration | 3. GIA I/O Configuration | 5. GIA Status        |
| 2. RS-485 Configuration             | 4. COM Setup             | 6. CAN Configuration |

**GEA Page Group**

- |                |               |                      |
|----------------|---------------|----------------------|
| 1. Engine Data | 2. GEA Status | 3. GEA Configuration |
|----------------|---------------|----------------------|

**GTX Page Group**

- |                                     |                              |
|-------------------------------------|------------------------------|
| 1. RS-232 / ARINC 429 Configuration | 2. Transponder Configuration |
|-------------------------------------|------------------------------|

**GRS Page Group**

- |                          |                          |
|--------------------------|--------------------------|
| 1. AHRS / Air Data Input | 2. GRS / GMU Calibration |
|--------------------------|--------------------------|

**GDC Page Group**

- |                      |                      |
|----------------------|----------------------|
| 1. ADC Configuration | 2. GDC Configuration |
|----------------------|----------------------|

**GFC Page Group**

- |                       |                |
|-----------------------|----------------|
| 1. GFC Configuration* | 2. GFC Status* |
|-----------------------|----------------|

**GMA Page Group**

- |                      |
|----------------------|
| 1. GMA Configuration |
|----------------------|

**GDL Page Group**

- |                   |                           |
|-------------------|---------------------------|
| 1. GDL 69 *       | 3. GDL 59 Configuration*  |
| 2. GDL 59 Status* | 4. GSR 56 Configuration * |

**CAL Page Group**

- |                          |                               |                     |
|--------------------------|-------------------------------|---------------------|
| 1. Fuel Tank Calibration | 2. Flaps and Trim Calibration | 3. HSCM Calibration |
|--------------------------|-------------------------------|---------------------|

\* If option is configured

### 3.4 G1000 / GFC 700 Software Information

#### 3.4.1 G1000 System Software Version

The G1000 System Software Version controls the approved combination of software and configuration files for the G1000 in a specific aircraft. The version loaded in an aircraft can be found on the MFD splash screen page in the upper right hand corner or on the MFD AUX – SYSTEM STATUS page.

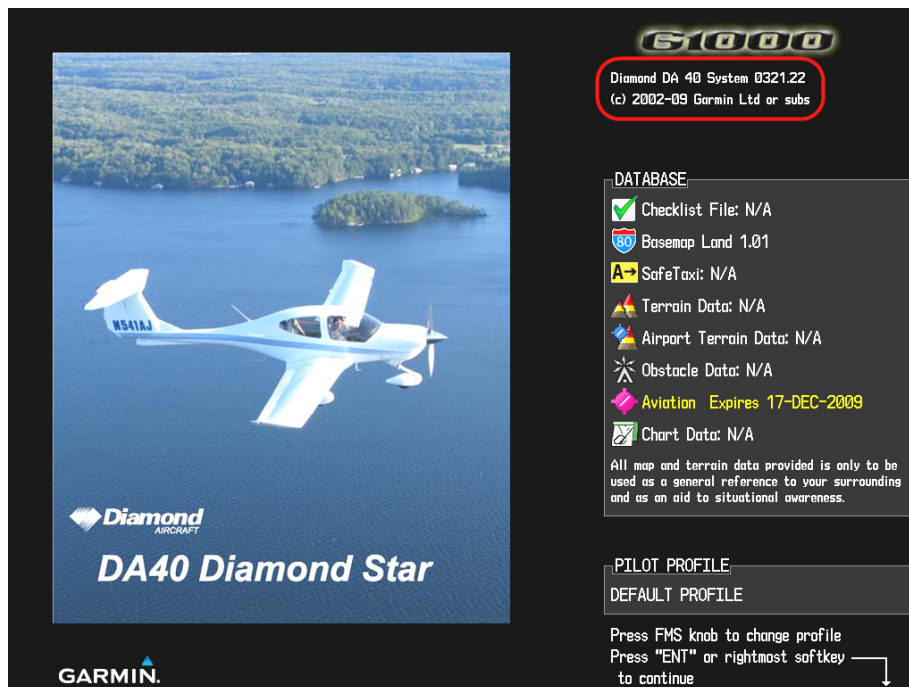


Figure 3-14. MFD Power Up Splash Screen System Software Version



Figure 3-15. MFD AUX –System Status Page System Software Version

---

An electronic G1000 System Software image specifically created for Diamond DA40 aircraft is required to install software and configuration settings to a new G1000 system. The software image is an electronically compressed group of G1000 software and configuration files which are defined on STC General Arrangement drawings, listed in Table 1-2. The image is used to extract the system files to an SD memory card, which in turn is used to load files to the G1000. Software image part numbers are normally defined with the prefix “006-”. Alternatively, the technician may purchase a pre-made loader card directly from Garmin, normally defined by the part number prefix “010-”.

**NOTE**

Garmin recommends the use of SanDisk brand SD cards to load G1000 software and configuration files. If software loading problems occur when using another brand of card, replace the card with a SanDisk brand SD card and reattempt the software load. For software loading, a minimum card size of 64 MB is recommended.

All software and configuration files were certified by Garmin and are considered part of FAA-approved Type Design data. Approved software and hardware definitions for each STC Configuration is defined on the appropriate General Arrangement drawing listed in Table 1-2.

**IMPORTANT!**

**To satisfy the G1000/GFC700 STC requirements for the DA 40, it is critical that the technician use a loader card which contains the correct System Software Version when servicing the G1000 system. Currently installed G1000 software version can be found on the MFD start-up screen or on the MFD AUX – SYSTEM STATUS page.**

**Approved System Software Versions are defined on the appropriate General Arrangement drawing (see Table 1-2).**

**CAUTION**

Be cautious when using software loader cards during maintenance. Do not insert a software loader card before verifying it is the correct part number for the aircraft you are servicing. The G1000 system immediately initializes the card upon power-up. On-screen prompts must be given careful attention in order to avoid potential loss of data. Always read through procedures given in Sections 5, 6, and 7, *before* attempting to use the software loader cards.

**CAUTION**

Remove Supplemental Data Cards (010-00330-41, 010-00330-42, or 010-00330-43) from the lower slot of the GDUs before loading any software. Supplemental Data Cards left inserted can become corrupt, making them unusable. Replacing corrupt cards is not covered under warranty.

### **3.4.2 Software Files**

Software files are the operating instructions for an LRU. They are defined by part number and version number on the General Arrangement drawing. See Table 1-2 for the correct General Arrangement drawing part numbers. Each G1000 / GFC 700 LRU reports the software version it currently contains to the user in two places.

- Normal System Mode: The AUX – SYSTEM STATUS page lists each LRU and the reported software version.
- Configuration Mode: The SYSTEM STATUS page (SYSTEM page group) reports more detailed LRU information, including software version, part number, and LRU status.

Software files are loaded to LRUs from the SYSTEM UPLOAD page in configuration mode. See Section 3.5.5.

---

### 3.4.3 Configuration Files

Configuration files define airframe specific features, engine parameters and equipment interfaces. They are divided into groups, and are displayed at the System Upload page during the software/configuration loading process. There are three categories of configuration files:

- **Calibration** *(See Section 3.4.3.3)*
- **DA40** *(See Section 3.4.3.1)*
- **DA40F** *(See Section 3.4.3.1)*
- **Options** *(See Section 3.4.3.2)*

#### 3.4.3.1 Default Configuration Files

Configuration files contain preset selections for input/output channels, aircraft-specific settings, and LRU-specific settings. The following list describes each of the Default configuration files used by the G1000:

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AIRFRAME</b>        | This file contains data such as airspeed parameters, engine/airframe sensor limitations, fuel tank parameters and alerting system settings that configure the G1000 specifically to the DA 40.                                                                                                                                                                                                                                   |
| <b>AIRFRAME ALERTS</b> | DA40-specific alerts are set when this file is loaded.                                                                                                                                                                                                                                                                                                                                                                           |
| <b>SYSTEM</b>          | This file configures the G1000 high-speed data bus (HSDB) to expect a PFD, MFD, and two GIAs and an optional GDL69A if configured.                                                                                                                                                                                                                                                                                               |
| <b>MANIFEST</b>        | This file loads a manifest checklist of all software part numbers and versions associated with an approved system configuration. The G1000 performs a software check between each LRU's reported version and the version contained on the manifest at system startup. If an inequality is detected for an LRU, this LRU is then excluded from the G1000 system and a manifest alert message is triggered to notify the operator. |
| <b>MFD1</b>            | This file configures MFD serial/discrete communication and alert system settings.                                                                                                                                                                                                                                                                                                                                                |
| <b>PFD1</b>            | This file configures PFD serial/discrete communication and alert system settings.                                                                                                                                                                                                                                                                                                                                                |
| <b>GIA1 / GIA2</b>     | These files configure GIA1/GIA2 serial/discrete communication settings.                                                                                                                                                                                                                                                                                                                                                          |
| <b>COM1 / COM2*</b>    | These files configure the GIA1/GIA2 COM Boards with the default DA40 COM configuration.                                                                                                                                                                                                                                                                                                                                          |
| <b>GMA</b>             | This file configures GMA 1347 audio and serial communication settings.                                                                                                                                                                                                                                                                                                                                                           |
| <b>GTX</b>             | This file configures GTX 33 transponder and serial communications settings.                                                                                                                                                                                                                                                                                                                                                      |
| <b>GEA1</b>            | This file configures GEA 71 engine/airframe parameters.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>GDC</b>             | This file configures GDC 74A air data values for the DA 40.                                                                                                                                                                                                                                                                                                                                                                      |
| <b>AUDIO CFG</b>       | This file configures audio alerts for the DA40.                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>CAL:</b>            | This file configures default fuel tank calibrations for the G1000.                                                                                                                                                                                                                                                                                                                                                               |

\*This item is only present and loaded when the optional GIA63W P/N 011-01105-20 is installed.

---

## **IMPORTANT!**

Every attempt should be made to **NOT** re-load the CAL (calibration) file. If loaded, these files will reset the fuel probe calibration data to default values and invalidate the fuel tank quantity indications. The fuel calibration procedure is then subsequently required to be performed.

### **3.4.3.2 Options Configuration Files**

The following optional configurations appear at the System Upload page within the ITEM menu, when the “Options” choice is selected from the GROUP menu as shown:

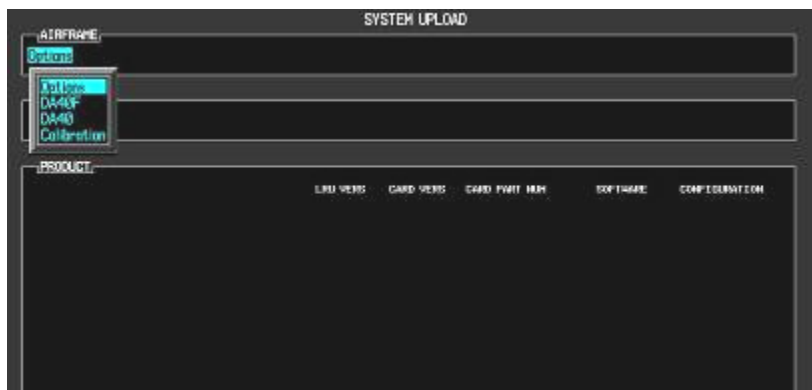


**Figure 3-16. Options Configuration Files System Upload Page**

Optional configuration files are generally loaded after the default configuration is established during software loading. Each configuration option contains one or more of previously listed configuration files (and sometimes software files). It is important to note that although these files have the same name as the defaults, they are usually subsets, only providing the necessary configuration changes from the default files to activate the desired option. Each file affects the configuration one or more LRUs. For a summary relationship between configuration files and LRUs, refer to Table 3-5.

DA40 F Option – Multiple Cylinders

DA40 F Option – Single Cylinder

DA40 F Option – Add Fuel Pressure Sensor

DA40 F Option - ESP

DA40 Option – ADF

DA40 Option – CO Guardian\*

DA40 Option – DME

DA40 Option – Display Fuel Pressure

DA40 Option – EASA Airspeed Tape

DA40 Option – Enhanced GFC700

DA40 Option - ESP

DA40 Option – Extended Range Tanks

DA40 Option – GDL59/GSR56

DA40 Option – GDL69

DA40 Option – Standalone GSR56

DA40 Option – No KAP 140

DA40 Option – Standard GFC 700

DA40 Option – TAS600 Series\*

DA40 Option – Stormscope\*

\*Note these options not certified for activation under this STC. An alternate additional installation approval must be obtained for these options.

---

### 3.4.3.3 Calibration File Group

The Calibration file group is selected from the GROUP menu as shown:



**Figure 3-17. Calibration Files System Upload Page**

When selected, the Calibration file group displays two CAL configuration options in the ITEM menu, one for standard range fuel tanks, and another for long-range fuel tanks.

Fuel tank configuration limits are contained in these files, including preset empty and full calibration points. This file group is intended to be used only during factory calibration procedures and normally is never required to be loaded during maintenance.

#### **IMPORTANT!**

When the CAL configuration files are loaded, **previous calibration data for the fuel tanks will be erased, causing the fuel quantity indicators to be invalid!** It is critical that the CAL configuration files not be loaded during maintenance unless absolutely necessary. Fuel tank recalibration per Section 4.6 **is required** if these files are loaded.

#### **IMPORTANT!**

For those modifications that install Garmin Display Unit P/N: 011-00972-10 in the PFD position, it is **REQUIRED** to update the system files and configuration **PRIOR** to installing new display unit. Failure to do so could result in deletion of fuel calibration data. See Section 7.1.1.

The following table summarizes the G1000 configuration file structure, including default and optional configurations, and the LRUs affected by each.

**Table 3-5. LRU to Configuration File Relationship Summary**

| LRU            |                               |                        | PFD                              |                    |        |       |          |                    | MFD | #1 GIA 63 | #2 GIA 63 | GMA 1347 | GTX 33    | GEA 71 | GDC 74B | GDL 69A | GDL 59 |            |        |   |
|----------------|-------------------------------|------------------------|----------------------------------|--------------------|--------|-------|----------|--------------------|-----|-----------|-----------|----------|-----------|--------|---------|---------|--------|------------|--------|---|
| FILE NAME      |                               |                        | AIRFRAME                         | AIRFRAME<br>ALERTS | SYSTEM | PFD 1 | MANIFEST | CAL <sup>(2)</sup> | MFD | GIA 1     | AUDIO CFG | GIA 2    | AUDIO CFG | GMA    | GTX 1   | GEA 1   | GDC 1  | GDL SYSTEM | GDL 59 |   |
| CONFIGURATIONS | DEFAULT CONFIG <sup>(2)</sup> |                        | X                                | X                  | X      | X     | X        |                    | X   | X         | X         | X        | X         | X      | X       | X       | X      |            |        |   |
|                | CALIBRATION <sup>(2)</sup>    | STD RANGE<br>FUEL TANK |                                  |                    |        |       |          | X                  |     |           |           |          |           |        |         |         |        |            |        |   |
|                |                               | EXT RANGE<br>FUEL TANK |                                  |                    |        |       |          | X                  |     |           |           |          |           |        |         |         |        |            |        |   |
|                | OPTIONS CONFIGURATION         |                        | MULTIPLE<br>CYLINDERS            | X                  |        |       |          |                    |     | X         |           | X        |           |        |         |         | X      |            |        |   |
|                |                               |                        | SINGLE<br>CYLINDER               | X                  |        |       |          |                    |     |           | X         |          | X         |        |         |         |        | X          |        |   |
|                |                               |                        | ADD FUEL<br>PRESSURE<br>SENSOR   |                    |        |       |          |                    |     |           | X         |          | X         |        |         |         |        | X          |        |   |
|                |                               |                        | DA40F ESP                        | X                  | X      |       |          |                    |     |           |           |          |           |        |         |         |        |            |        |   |
|                |                               |                        | ADF                              |                    |        |       |          |                    |     |           |           |          |           | X      |         |         |        |            |        |   |
|                |                               |                        | CO GAURDIAN <sup>(1)</sup>       | X                  | X      |       |          |                    |     |           |           |          |           | X      |         |         |        |            |        |   |
|                |                               |                        | DME                              |                    |        |       |          |                    |     |           |           |          |           | X      |         |         |        |            |        |   |
|                |                               |                        | DISPLAY FUEL<br>PRESSURE         | X                  |        |       |          |                    |     |           |           |          |           |        |         |         |        |            |        |   |
|                |                               |                        | EASA<br>AIRSPEED<br>TAPE         | X                  |        |       |          |                    |     |           |           |          |           |        |         |         |        |            |        |   |
|                |                               |                        | ENHANCED<br>GFC 700              | X                  | X      |       |          | X                  |     | X         | X         |          | X         |        |         |         |        |            |        |   |
|                |                               |                        | DA40 ESP                         | X                  | X      |       |          |                    |     |           |           |          |           |        |         |         |        |            |        |   |
|                |                               |                        | EXTENDED<br>RANGE TANKS          | X                  |        |       |          |                    |     |           |           | X        |           | X      |         |         | X      |            |        |   |
|                |                               |                        | GDL 59<br>/ GSR 56               | X                  | X      | X     |          |                    |     |           |           |          |           |        |         |         |        |            |        | X |
|                |                               |                        | GDL 69                           | X                  |        | X     |          |                    |     |           |           |          |           |        |         |         |        |            | X      |   |
|                |                               |                        | STANDALONE<br>GSR 56             | X                  | X      |       |          |                    |     |           |           |          |           | X      |         |         |        |            |        |   |
|                |                               |                        | NO KAP 140                       | X                  | X      |       |          |                    |     |           |           |          |           | X      |         |         |        |            |        |   |
|                |                               |                        | STANDARD<br>GFC 700              | X                  | X      |       |          | X                  |     | X         | X         |          | X         |        |         |         |        |            |        |   |
|                |                               |                        | TAS 600<br>SERIES <sup>(1)</sup> |                    |        |       |          |                    |     |           |           |          |           | X      |         |         |        |            |        |   |
|                | STORMSCOPE <sup>(1)</sup>     |                        |                                  |                    |        |       |          |                    |     |           |           | X        |           |        |         |         |        |            |        |   |

**Table 3-5. LRU to Configuration File Relationship Summary (Cont)**

| CONFIGURATIONS |  |                                               | OPTIONS ACTIVATION CONFIGURATION | LRU | PFD       |          |                 |        |       |          | MFD                | #1 GIA 63 | #2 GIA 63 | GMA 1347  | GTX 33 | GEA 71    | GDC 74B | GDL 69A | GDL 59 |
|----------------|--|-----------------------------------------------|----------------------------------|-----|-----------|----------|-----------------|--------|-------|----------|--------------------|-----------|-----------|-----------|--------|-----------|---------|---------|--------|
|                |  |                                               |                                  |     | FILE NAME | AIRFRAME | AIRFRAME ALERTS | SYSTEM | PFD 1 | MANIFEST | CAL <sup>(2)</sup> | MFD       | GIA 1     | AUDIO CFG | GIA 2  | AUDIO CFG | GMA     | GTX 1   | GEA 1  |
|                |  | TAWS <sup>(3)(4)</sup>                        | X                                |     |           |          |                 |        |       |          |                    |           |           |           |        |           |         |         |        |
|                |  | CHARTVIEW <sup>(3)(4)</sup>                   | X                                |     |           |          |                 |        |       |          |                    |           |           |           |        |           |         |         |        |
|                |  | ESP <sup>(3)(4)</sup>                         |                                  |     |           |          |                 |        |       | X        |                    | X         |           |           |        |           |         |         |        |
|                |  | ENHANCED SEARCH & RESCUE <sup>(3)(4)</sup>    | X                                |     |           |          |                 |        |       |          |                    |           |           |           |        |           |         |         |        |
|                |  | SYNTHETIC VISION & PATHWAYS <sup>(3)(4)</sup> | X                                |     |           |          |                 |        |       |          |                    |           |           |           |        |           |         |         |        |

**IMPORTANT!**

- (1) Noted options are not certified for activation under this STC. An alternate additional installation approval must be obtained for these options.
- (2) RELOADING THE CAL FILE REQUIRES FUEL TANK RECALIBRATION!
- (3) To enable these functions, a separate “Enable” SD Card is required. See the appropriate General Arrangement drawing for card part numbers.
- (4) If, during maintenance, the default PFD configuration files are ever reloaded, these options must be reactivated. See Sections 3.5.9, 3.5.10, 3.5.11, 3.5.12 and 3.5.13 respectively.

### 3.4.4 Configuration File Storage

The G1000 system is designed to store all configuration settings in various places so that the configuration is retained in the aircraft during maintenance of units.

During system configuration, each file is sent directly to the applicable LRU where it is stored in local LRU memory (except GRS 77 & GDC 74A). The PFD has a configuration module located in the connector backshell (see Section 6.12) to store critical system settings such as system ID, calibration data, and unlock options. If the PFD is replaced, all configuration files must be reloaded using an approved loader card image and all unlock options reactivated.

**NOTE**

The GRS 77 AHRS and GMU 44 Magnetometer do not have a configuration file. However, these LRUs do store calibration data acquired at initial installation or replacement which are specific to the aircraft. Replacing these units or their mounting hardware may require re-calibration. See Section 7.7.2 for more information on re-calibration criteria.

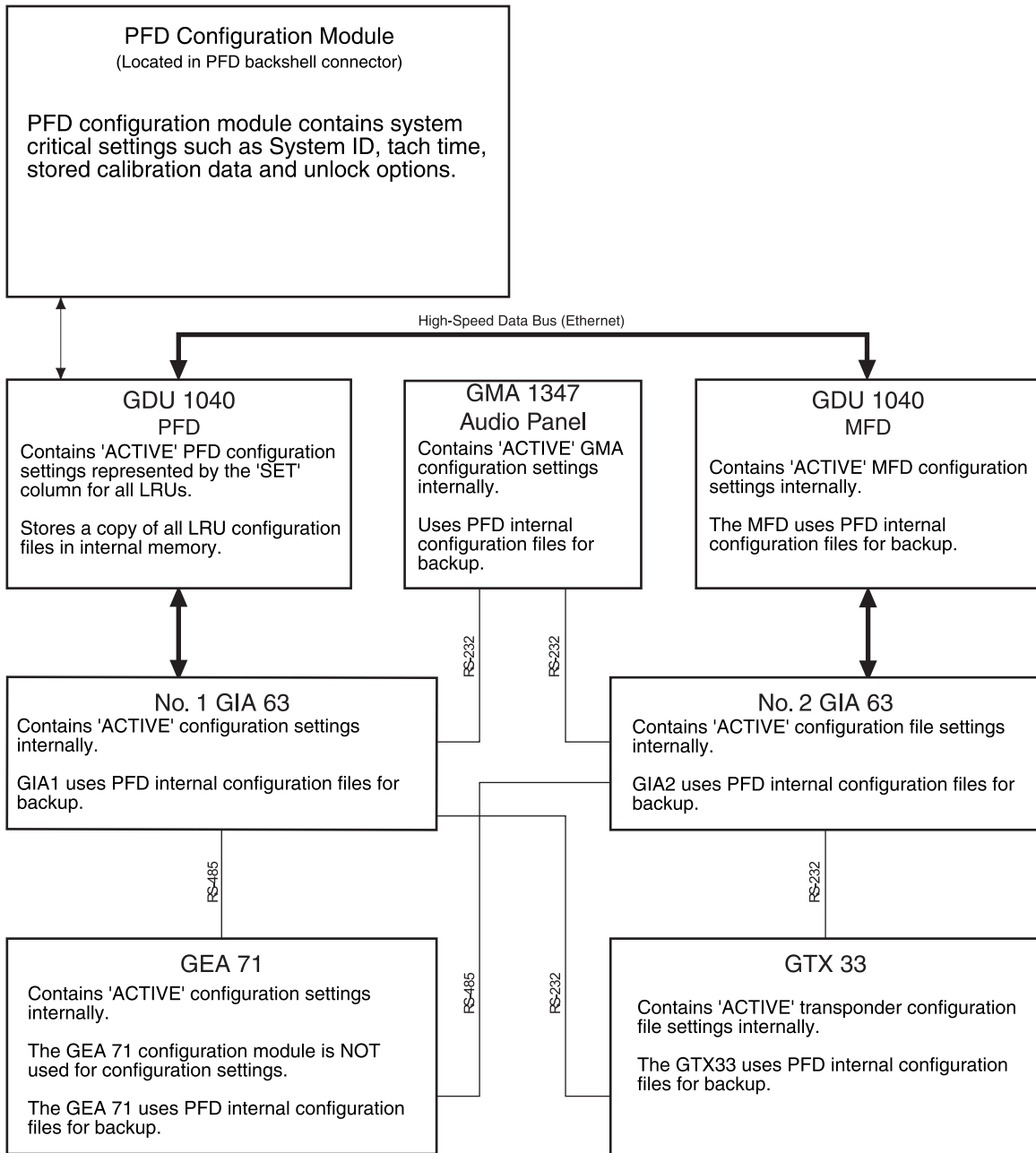


**Figure 3-18. G1000 LRU Configuration File Storage**

**NOTE**

For system software versions 0321.17 and earlier, the PFD configuration module stores a complete copy of the configuration settings contained within PFD internal memory.

The GRS 77 and GDC 74A configuration modules function differently than the rest of the system. The GDC 74A's configuration file is loaded directly to GDC internal memory. A copy of the file is stored in the GDC configuration module.

The GRS 77 configuration module does not store any configuration files. Instead, it stores calibration data recorded during the installation calibration process.

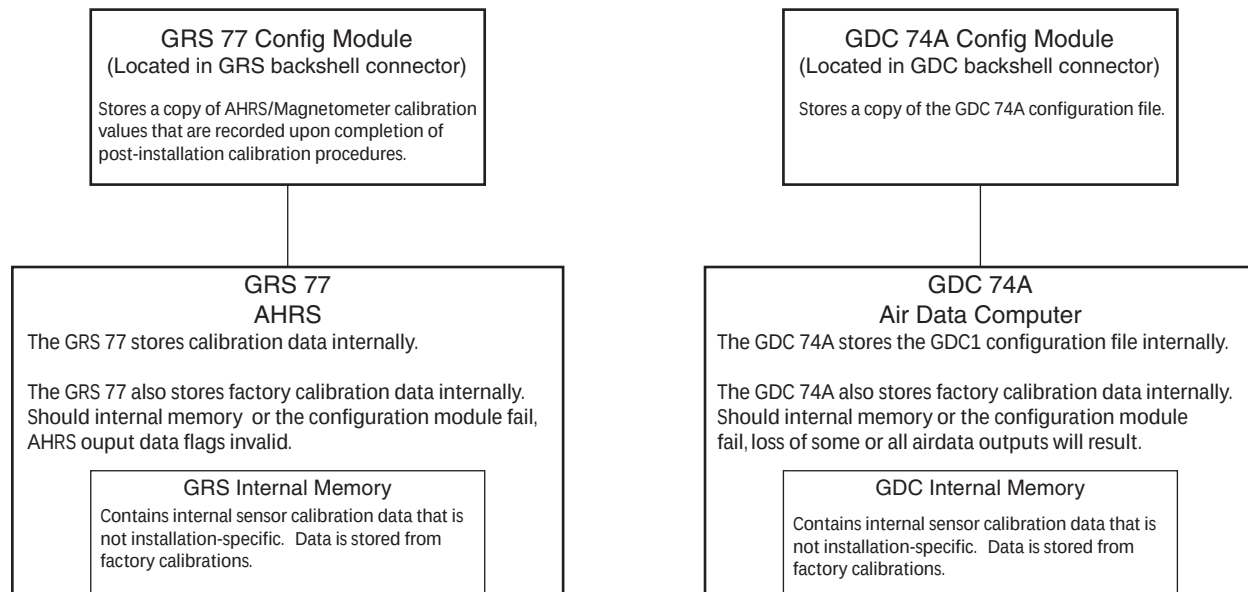


**Figure 3-19. GRS/GDC Configuration Settings Storage**

### 3.5 G1000 Software/Configuration Procedure

This section summarizes the procedures required to load software and configuration files to the G1000 system. It is intended to work as a central guide for technicians to use while performing maintenance on the aircraft. In sections of this manual where software is required to be reloaded, these sections will make reference back to this Section for instructions. The technician should use proper judgment regarding the context of maintenance required while following this section.

The following diagram depicts an overview of the software/configuration sequence for the G1000 system. This applies mostly to a new G1000 system which has not previously been powered up on a complete system software load and is for informative purposes only.

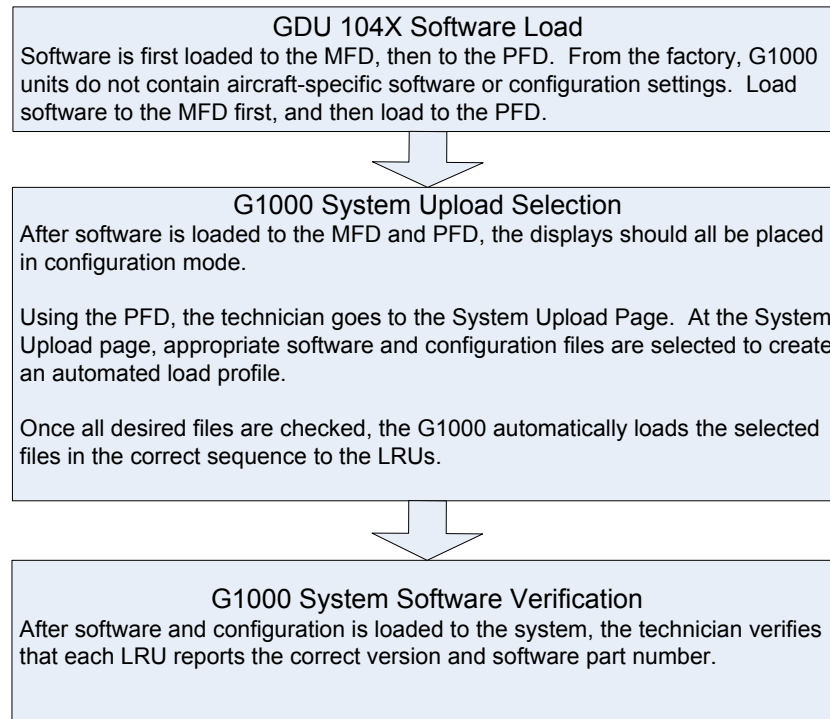


**Figure 3-20. Software/Configuration Overview**

---

### 3.5.1 System Power Up

Apply power to the G1000 by doing the following:

1. Ensure there are no database cards inserted in the MFD and PFD lower card slots. If there are, remove them until instructed to install them.
2. Turn on the ground power unit, if used.
3. Turn on the BAT side master switch.
4. Turn on the AVIONICS MASTER switch. At this moment, all G1000 equipment should be receiving power.

### 3.5.2 MFD & PFD Boot Block Software Check

1. Pull the MFD and PFD circuit breakers.
2. While holding the ENT key on the MFD, restore power by closing the MFD circuit breaker.
3. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the MFD, release the ENT key.
4. Repeat Steps 2 and 3 for the PFD.
5. At this point, the MFD and PFD should be operating in configuration mode, displaying the System Status page.
6. Activate the cursor on both displays and scroll through the list of LRUs. Highlight 'PFD1' on the PFD, and 'MFD1' on the MFD.
7. Check the currently reported GDU boot block software version, indicated by 'BB Version' on each display.

#### **IMPORTANT!**

If the GDU boot block software is less than 2.03, the boot block must be updated prior to loading GDU 8.20 software (System Software 0321.17 or later). Continue to the next section, Updating GDU Boot Block.

If the reported version is already 2.03, boot block is correct and does not require updating. If GDU 9.01 software is being loaded (System Software 0321.18 or later), the boot block will update automatically; the technician may skip to the GDU software loading section.

### 3.5.3 Updating GDU Boot Block

1. Obtain the GDU boot block update software. Refer to the appropriate General Arrangement drawing (see Table 1-2) for the boot block software P/N.

#### **NOTE**

The GDU boot block update may be obtained by downloading the electronic file from Garmin (see GA dwg for 006- P/N, accessible via the dealer web site). This electronic download may be used to build an SD card to update the GDU boot block. In addition, the technician may obtain a pre-manufactured update card from Garmin, via the listed 010- card part number in the General Arrangement drawings.

2. Pull the MFD and PFD circuit breakers.
3. Insert the boot block update card into the MFD.
4. While holding the ENT key on the MFD, restore power by closing the MFD circuit breaker.

- 
- When the words **INITIALIZING SYSTEM** appear in the upper left corner of the MFD, release the ENT key.
  - The system automatically compares the existing GDU 104X boot block with the version on the boot block update card. If a difference exists, the GDU prompts to load new boot block:

```
INITIALIZING SYSTEM.  
DO YOU WANT TO UPDATE THE BOOT BLOCK FROM 2.00 TO 2.03?  
NO WILL BE ASSUMED IN 30 SECONDS.
```

- MAKE CERTAIN that power will remain applied to the system with no possibility of accidental shutdown. Press the ENT key and new boot block will be loaded:

```
INITIALIZING SYSTEM.  
DO YOU WANT TO UPDATE THE BOOT BLOCK FROM 2.00 TO 2.03?  
NO WILL BE ASSUMED IN 30 SECONDS.  
  
UPDATING BOOT BLOCK. DO NOT TURN OFF POWER!!!
```

- Remove the GDU Boot Block update card from the MFD and install in the PFD.
- Repeat Steps 4 through 7 for the PFD.
- When finished updating both displays, remove the boot block update card, and pull the MFD and PFD circuit breakers to remove power from the displays.

### 3.5.4 MFD & PFD Software Load

Follow this procedure to load software to the MFD and PFD.

- After verifying and/or updating GDU boot block, insert the correct G1000 software loader card which is applicable for the desired STC configuration into the MFD top card slot (see appropriate GA drawing in Table 1-2).
- With the G1000 systems powered on, pull the MFD and PFD circuit breakers.
- While holding the ENT key on the MFD, restore power by closing the MFD circuit breaker.
- When the words **INITIALIZING SYSTEM** appear in the upper left corner of the MFD, release the ENT key.
- Press the ENT key to acknowledge the following prompt to load new software (NOTE: A softkey labeled 'YES' appears in the lower right corner and may be used in lieu of the ENT key):

```
INITIALIZING SYSTEM.  
  
LOADER CARD:  
- DIAMOND DA 40/40F -  
GPN 010-00321-13  
  
DO YOU WANT TO UPDATE SYSTEM FILES?  
NO WILL BE ASSUMED IN 30 SECONDS.
```

6. The following screen is displayed:

```
INITIALIZING SYSTEM.  
  
LOADER CARD:  
- DIAMOND DA 40/40F -  
GPN 010-00321-13  
  
DO YOU WANT TO UPDATE SYSTEM FILES?  
NO WILL BE ASSUMED IN 30 SECONDS.  
  
UPDATING SYSTEM FILES, PLEASE WAIT.  
.....  
  
UPDATED 88 FILES SUCCESSFULLY!  
PRESS ANY KEY TO CONTINUE.  
CONTINUING IN 10 SECONDS.
```

7. New software is loaded to the MFD and the following screen is displayed:

```
DO YOU WANT TO UPDATE THE SPLASH SCREEN?  
NO WILL BE ASSUMED IN 30 SECONDS.
```

8. Press the softkey labeled 'NO'. Note that the splash screen will need to be loaded after all software and configuration loading is completed.
9. When complete, the display starts in configuration mode.
10. Remove the software loader card from the MFD and insert it into the top card slot of the PFD. Repeat Steps 3 through 8 for the PFD.

### 3.5.5 G1000 System Software Upload

The System Upload page allows a technician to load LRU software and system configuration files in an automated sequence. This Section steps through a complete G1000 system software load procedure for the same version software currently installed in the aircraft. To upgrade G1000 system software to a newer version, refer to the Field Update Instructions document for the version you wish to install. **For individual LRU software loading, see the LRU specific software loading instructions in Section 7.**

#### **CAUTION**

**DO NOT ALLOW POWER TO BE REMOVED FROM THE G1000 SYSTEM WHEN LOADING SOFTWARE.** Connect a ground power unit to the aircraft for software loading. Do not rely on only the aircraft batteries during the software loading process. Power loss during a software upgrade may cause a LRU to become corrupted and unresponsive requiring replacement. Replacing corrupted units are not covered under warranty. Remove power only when told to do so in the procedure.

#### **IMPORTANT!**

When restarting the G1000 system after previously having been in configuration mode, a GIA63W may occasionally remain in configuration mode. Display symptoms include a red AFCS annunciation and cycling of the transponder field between valid and invalid states. To clear this condition, cycle power only to the PFD and MFD by opening the PFD and MFD circuit breakers for ~30 seconds, then resetting them.

## GENERAL NOTES:

- The software loader card must have the correct software version before loading any files into the G1000 system. Loading the files from a different G1000 software version loader card will prevent the system from operating correctly. Verify the software part number on the MFD AUX – SYSTEM STATUS page matches the software part number listed in the “ldr\_part\_nmbr.txt” file on the loader card.
- All GDU displays should be in the same mode (configuration or normal) for loading software unless instructed differently. If the displays are not in the same mode, the software load may not be successful.
- Remove Supplemental Database Cards from the lower slot of all displays before loading software into any unit. Not removing the cards may corrupt them during a software upload. Replacing corrupted database cards are not covered under warranty.
- Garmin recommends the use of SanDisk SD cards for loading software and configuration files. Use of other brand cards is not recommended.
- Determine what optional equipment (i.e. ADF, DME, GFC700, etc.) is installed in the aircraft before loading software. Optional equipment configuration files will need to be reloaded to re-enable them. Failure to load configuration files for optional equipment will prevent them from working properly.
- Determine what optional features (i.e. TAWS, Synthetic Vision (SVT), Jeppesen ChartView, ESP, etc.) are installed before loading the AIRFRAME configuration file. If the AIRFRAME configuration file is loaded from the G1000 system software loader card, you will need to re-unlock the optional features using their unlock cards. Failure to re-unlock configuration files for optional features will prevent them from working.
- Pressing the ENT key will check and uncheck the highlighted configuration box.

## NOTE

**Verify the presence or non-presence of GIA63W WAAS units to help you choose the correct software to load (see Figure 3-21 and Figure 3-22).** Loading WAAS software into a non-WAAS unit or vice-versa may make the unit inoperable. Unit repairs due to loading the wrong software is not covered under warranty. You can use the SYSTEM STATUS config page to verify which type of GIA unit is installed.

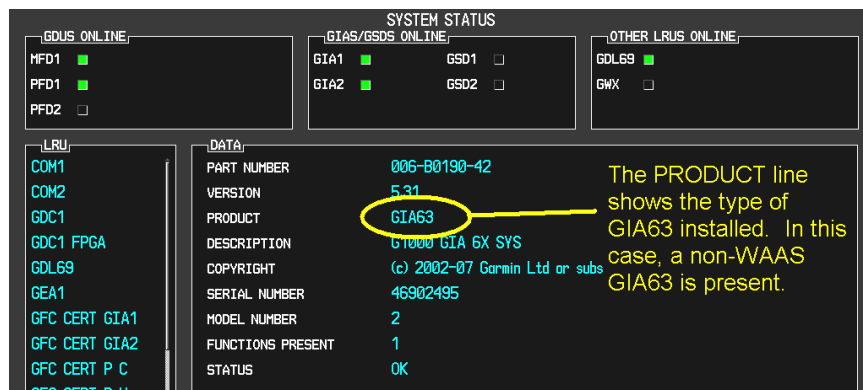


**Figure 3-21. Non-WAAS (GIA 63) System Status Page**

**Figure 3-22. WAAS (GIA 63W) System Status Page**

- IMPORTANT!**

Ensure that the correct airframe type is selected before proceeding; otherwise, incorrect configuration information will be loaded.

- IMPORTANT!**

3. Once an airframe type is selected the cursor moves to the ITEM window. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate aircraft model (WAAS or non-WAAS) and press ENT.

**Figure 3-23. System Upload Page**

- 
4. The PRODUCT window will populate and display software and default configuration file lists for each G1000 LRU. The LRU VERS column shows the currently loaded software version in the LRU, whereas the CARD VERS column shows the LRU software version stored on the loader card. Each check designates a file to be loaded to the G1000.

If an inequality between the LRU VERS and CARD VERS columns is detected, the SOFTWARE and CONFIGURATION boxes will be pre-selected (checked) for each LRU reporting a different software version than the one on the card.

The following softkeys provide an easy way to select files:

CHK ALL: Selects all files, both configuration and software

CHK SW: Selects all SW files only.

CHK CFG: Selects all configuration files only.

CLR ALL: Clears all selections.

LOAD: Starts the software loading process.

#### **NOTE**

If this is the first time loading software and configuration to a new installation, it is advised to leave all check boxes selected. However, for maintenance purposes, it may not be necessary to reload all software and configuration files. The technician should be sure of the software requirements and load the appropriate files, including any options (see Section 3.5.6). If there is any doubt, the CHK ALL softkey is recommended. **It is also highly recommended that the CAL configuration file NOT be loaded unless replacing the fuel probes. If this file is inadvertently reloaded, the fuel probes MUST be recalibrated per Section 4.6.**

5. After verifying that the desired software and configuration files are checked, press the LOAD softkey. The G1000 system automatically begins loading software and default configuration files to the selected LRUs in the proper order.

#### **IMPORTANT!**

If non-WAAS GIA 63s are installed, the software boot block version must be checked *while software is being loaded to EACH GIA 63*. Wait until the software loading process begins to load the GIA 63 software. On the MFD, go to the System Status page and activate the cursor. Highlight GIA1. Observe the DESCRIPTION field. When it changes to read 'G1000 GIA 6X BBL', verify that the reported VERSION is 4.01 or higher. Repeat this for GIA2. If either GIA 63 has software boot block less than version 4.01, current boot block software must be loaded per Section 3.5.7 *after* the current GIA software load process completes. There is no need to interrupt the GIA system software from loading.

6. When the system finishes loading, it prompts the technician accordingly. Press the ENT key to acknowledge that the upload is finished:



7. Verify that each column indicates ☒ **PASS** in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.

---

### 3.5.6 Loading Airframe Options

After the base factory defaults are loaded to the G1000, the technician must check and verify which equipment or installation options exist on the aircraft. See the options list in 3.4.3.

If the DA 40 aircraft being updated is equipped with any additional equipment options, follow this procedure to load them.

#### **IMPORTANT**

For System software version 0321.23 or later, loading the STANDARD GFC 700 option requires that the -1 STC Configuration must be installed with GSA 81 Servo Actuators P/N 011-00878-00 and GSM 85 Servo Gearbox P/N 011-00894-07 and 011-00894-04 or GSM 86 Servo Gearbox P/N 011-01904-03.

If the incorrect GFC 700 option is loaded the servo software and gains will not load but the SUMMARY field will still indicate PASS. If this occurs simply reselect the correct option and reload. If it is not caught later in this procedure when the software verification is confirmed an AFCS failure will be annunciated on the PFD until the correct software is loaded.

#### **IMPORTANT!**

For System software version 0321.23 or later, loading the ENHANCED GFC 700 option requires that the -1 STC Configuration must be installed with GSA 81 Servo Actuators P/N 011-00878-20 and GSM 86 Servo Gearbox P/N 011-01904-03.

If the incorrect GFC 700 option is loaded the servo software and gains will not load but the SUMMARY field will still indicate PASS. If this occurs simply reselect the correct option and reload. If it is not caught later in this procedure when the software verification is confirmed an AFCS failure will be annunciated on the PFD until the correct software is loaded.

#### **NOTE**

TAWS, ChartView, ESP, Enhanced SAR and SVS options are covered in a separate section. See Sections 3.5.9, 3.5.10, 3.5.11, 3.5.12 and 3.5.13 respectively.

1. At the System Upload page, activate cursor and rotate the FMS knob once to activate the GROUP menu.
2. Select 'Options' from the GROUP window and press ENT.
3. From the ITEM window, and select the desired airframe option to load.
4. Press the ENT key.
5. At this point, any applicable configuration and software files will be displayed in the PRODUCT window.
6. After reviewing the files to be loaded, press the LOAD ALL softkey.
7. Monitor the status of the upload. When the upload is finished, press ENT to acknowledge.
8. View the SUMMARY field and ensure that all items are 'complete': Verify that PASS appears in green at the check box for each file.
9. Repeat for each additional option configuration.

### 3.5.7 GIA 63 Boot Block Update

For GIA 63s, boot block version 4.01 or higher is required to work with version 5.31 or later operating system software. There may be instances during maintenance where an older GIA may be installed from a spares pool or as a replacement. It is important to verify boot block during operating system software loading to ensure version 4.01 or higher is present (refer to Step 5 of 3.5.5).

If it was determined in the software loading procedure that the GIA 63s did not have boot block version 4.01 or higher, follow this procedure to update the GIA 63's software boot block. Note that this does not apply to GIA 63Ws.

#### **IMPORTANT!**

It is critical that electrical power be kept on during the boot block update procedure. Take steps to ensure that a 28 VDC ground power supply is properly connected and is not disturbed during the update.

1. Obtain the required GIA 63 Boot Block loader card from Garmin. The card part number is listed on the appropriate General Arrangement drawing. Alternatively, the GIA boot block update may be obtained by downloading the electronic file from Garmin, accessible via the dealer web site (see GA dwg for approved 006- P/N). This electronic download may be used to build an SD card to update the GIA boot block.
2. Insert the card into the top slot of the PFD and apply system power to the G1000.
3. On the PFD, go to the System Upload page using the FMS knob.
4. Activate the cursor and in the GROUP field select GIA Boot Block. Press the ENT key.
5. The cursor drops down to the ITEM field. Rotate the small FMS knob and select GIA Boot Block 4.01 and press the ENT key.

| SYSTEM UPLOAD                                |          |           |               |                                     |               |
|----------------------------------------------|----------|-----------|---------------|-------------------------------------|---------------|
| <b>AIRFRAME</b>                              |          |           |               |                                     |               |
| GIA Boot Block                               |          |           |               |                                     |               |
| <b>FILE</b>                                  |          |           |               |                                     |               |
| GIA Boot Block 4.01                          |          |           |               |                                     |               |
| <b>PRODUCT</b>                               |          |           |               |                                     |               |
|                                              | LRU VERS | CARD VERS | CARD PART NUM | SOFTWARE                            | CONFIGURATION |
| GIA 1                                        | T5.21n   | ALL       | 006-00190-BE  | <input checked="" type="checkbox"/> | N/A           |
| GIA 2                                        | T5.21n   | ALL       | 006-00190-BE  | <input checked="" type="checkbox"/> | N/A           |
| <b>SUMMARY</b>                               |          |           |               |                                     |               |
|                                              |          |           |               |                                     |               |
| CHK ALL CHK SW CHK CFG CLR ALL LOAD UPDT CFG |          |           |               |                                     |               |

**Figure 3-24. GIA Boot Block Upload Page**

6. Verify that the SOFTWARE boxes are check for both GIA 1 and GIA 2.
7. MAKE CERTAIN that power will remain applied to the system with no possibility of accidental shutdown. Press the LOAD softkey.
8. The GIA boot block software is loaded. Be sure to not remove electrical power from the G1000 during this update.

9. When the boot block software finishes loading, acknowledge the following prompt by pressing the ENT key:



**Figure 3-25. GIA Boot Block Upload Complete Page**

10. The boot block update procedure is complete. On the MFD System Status Page, highlight GIA1 and GIA2 and verify both units are reporting 'OK' status and that the GIAS ONLINE field shows two green boxes.
11. Remove the GIA Boot Block loader card from the PFD and re-insert the correct G1000/GFC700 Software Loader card.
12. Restart the PFD and MFD in configuration mode by cycling the PFD and MFD circuit breakers. Hold the ENT key on both displays while they power up until the words INITIALIZING SYSTEM appear in white. The PFD may show a prompt to load system software files. Press the NO softkey or press CLR.
13. Continue with the software loading and configuration procedure and load any remaining files according to the procedures in Section 3.5.5.

### 3.5.8 Software Check

Anytime software and configuration loading procedures are accomplished during maintenance, it is highly recommended to conduct a final software review of the system.

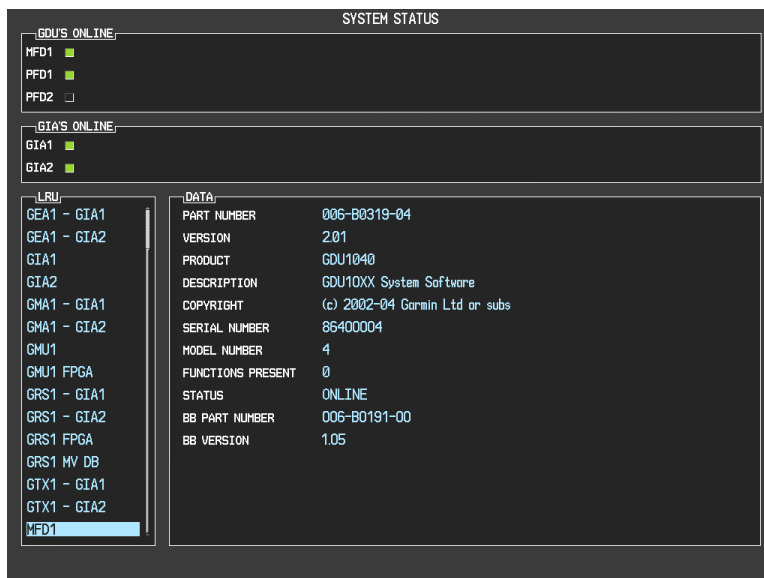


**Figure 3-26. System Status Page (SW v0321.19 and earlier)**



**Figure 3-27. System Status Page (SW v0321.22 or later)**

1. Go to the System Status page using the FMS knob. Activate the cursor.
2. Highlight each of the following items in the LRU window, and verify that the software part number and version matches the information in the appropriate General Arrangement drawing:

| <u>LRU</u>                      | <u>SW VER</u> | <u>LRU</u>                    | <u>SW VER</u> |
|---------------------------------|---------------|-------------------------------|---------------|
| ADF 1 <sup>(5)</sup>            | _____         | GPS1                          | _____         |
| COM 1 <sup>(2)</sup>            | _____         | GPS2                          | _____         |
| COM 2 <sup>(2)</sup>            | _____         | GRS1                          | _____         |
| GDC1                            | _____         | GRS1 FPGA                     | _____         |
| GDC1 FPGA                       | _____         | GRS1 MV DB                    | _____         |
| GDL 59 <sup>(6)</sup>           | _____         | GS 1                          | _____         |
| GDL 59 Router <sup>(6)</sup>    | _____         | GS 2                          | _____         |
| GDL 59 Router FS <sup>(6)</sup> | _____         | GSA PTCH CTL <sup>(1)</sup>   | _____         |
| GDL69                           | _____         | GSA PTCH MON <sup>(1)</sup>   | _____         |
| GEA1                            | _____         | GSA PTCH TRM C <sup>(1)</sup> | _____         |
| GFC CERT GIA1 <sup>(1)</sup>    | _____         | GSA PTCH TRM M <sup>(1)</sup> | _____         |
| GFC CERT GIA2 <sup>(1)</sup>    | _____         | GSA ROLL CTL <sup>(1)</sup>   | _____         |
| GFC CERT P C <sup>(1)</sup>     | _____         | GSA ROLL MON <sup>(1)</sup>   | _____         |
| GFC CERT P M <sup>(1)</sup>     | _____         | GSR 1 <sup>(7)</sup>          | None          |
| GFC CERT PT C <sup>(1)</sup>    | _____         | GTX1                          | _____         |
| GFC CERT PT M <sup>(1)</sup>    | _____         | MFD1                          | _____         |
| GFC CERT R C <sup>(1)</sup>     | _____         | MFD1 FPGA                     | _____         |
| GFC CERT R M <sup>(1)</sup>     | _____         | NAV 1 <sup>(3)</sup>          | _____         |
| GIA1                            | _____         | NAV 1 BB <sup>(3)</sup>       | _____         |
| GIA1 AUDIO                      | _____         | NAV 1 FPGA <sup>(3)</sup>     | _____         |
| GIA2                            | _____         | NAV 2 <sup>(3)</sup>          | _____         |
| GIA2 AUDIO                      | _____         | NAV 2 BB <sup>(3)</sup>       | _____         |
| GMA1                            | _____         | NAV 2 FPGA <sup>(3)</sup>     | _____         |
| GMU1                            | _____         | PFD1                          | _____         |
| GMU1 FPGA                       | _____         | PFD1 FPGA                     | _____         |

Note 1 - GFC 700-equipped aircraft.

Note 2 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the COM 1 and COM 2 software version is dependent on the hardware and is not field loadable. The software levels may not be the same.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 3 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the NAV 1 and NAV 2, software version is dependent on the hardware and is not field loadable. The software levels may not be the same and NAV 1 BB, NAV 1 FPGA, NAV 2 BB, NAV 2 FPGA will be displayed as UNKNOWN. With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 4 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the GS 1 and GS 2 software version is dependent on the hardware and is not field loadable. The software levels may not be the same.

---

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 5 – Aircraft with ADF installed, third party ADF will not report software version and will be displayed as UNKNOWN.

Note 6 – GDL 59 equipped aircraft.

Note 7 – GSR 56 equipped aircraft.

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### 3.5.9 TAWS Reactivation

If the TAWS option was previously enabled and the G1000 was reconfigured (default GROUP configuration file was loaded), it is necessary to reactivate TAWS. Perform this procedure to reactivate TAWS.

#### **NOTE**

When the TAWS option is enabled for the first time (normally at Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate TAWS in another G1000 system. This unlock card is tied to the specific aircraft in which it was used for the first time. For situations where TAWS must be re-activated, this card must be used. Reference section 1.6 and the applicable General Arrangement Drawing for Unlock card details.

1. Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
2. A special TAWS Unlock card is required to enable TAWS. Refer to the appropriate General Arrangement drawing for the correct part number. Insert this card in the upper slot of the PFD.
3. While holding the ENT key on the PFD and MFD, restore power to the displays.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of both displays, release the ENT keys.
5. On the PFD, go to the System Upload page using the FMS knob.
6. Activate the cursor. Use the small FMS knob to select OPTIONS in the GROUP field and press the ENT key.
7. Highlight the ITEM field. Use the small FMS knob to select the 'Enable TAWS' option and press the ENT key. Once the option is selected, the configuration files in the SECTION field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
8. Press the LOAD softkey.
9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
10. View the SUMMARY field and ensure that the item is 'COMPLETE'.
11. De-activate the cursor.
12. Power down the system and remove the TAWS Enable card from the PFD.

---

### 3.5.10 ChartView Reactivation

If the ChartView option was previously enabled and the G1000 was reconfigured (default GROUP configuration file was loaded), it is necessary to reactivate ChartView.

Perform this procedure to reactivate ChartView.

#### **NOTE**

When the ChartView option is enabled for the first time (normally at the Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate the ChartView feature in other G1000 systems. The unlock card is forever tied to the specific aircraft in which it was used for the first time. For situations where ChartView must be re-activated, this card must be used. Reference section 1.6 and the applicable General Arrangement Drawing for Unlock card details.

1. Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
2. A special ChartView Unlock card is required to activate this feature. Refer to the appropriate General Arrangement drawing for the correct part number. Insert this card in the upper slot of the PFD.
3. While holding the ENT key on the PFD and MFD, restore power to both displays by closing the PFD and MFD circuit breakers.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the displays, release the ENT key.
5. On the PFD, go to the System Upload page using the FMS knob.
6. Activate the cursor. Use the small FMS knob to select OPTIONS in the GROUP field and press the ENT key.
7. Highlight the ITEM field. Use the small FMS knob to select the “Enable ChartView” option and press the ENT key. Once the option is selected the configuration files in the SECTION field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
8. Press the LOAD softkey.
9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
10. View the SUMMARY field and ensure that the item is ‘COMPLETE’.
11. De-activate the cursor.
12. Power down the system and remove the ChartView Enable card from the PFD.

#### **NOTE**

ChartView databases are required to be installed on the terrain database cards to function (see Section 3.5.17 ). ChartView databases are subscription-based and are to be procured by the aircraft owner directly from Jeppesen.

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### 3.5.11 ESP Reactivation

If the ESP option was previously enabled and the G1000 was reconfigured (default GROUP configuration file was loaded), it is necessary to reactivate ESP.

Perform this procedure to reactivate ESP.

#### **NOTE**

When the ESP option is enabled for the first time (normally at the Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate the ESP feature in other G1000 systems. The unlock card is forever tied to the specific aircraft in which it was used for the first time. For situations where ESP must be re-activated, this card must be used. Reference section 1.6 and the applicable General Arrangement Drawing for Unlock card details.

1. Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
2. A special Enhanced AFCS Unlock Card is required to activate this feature. Refer to the appropriate General Arrangement drawing for the correct part number. Insert this card in the upper slot of the PFD.
3. While holding the ENT key on the PFD and MFD, restore power to both displays by closing the PFD and MFD circuit breakers.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the displays, release the ENT key.
5. On the PFD, go to the System Upload page using the FMS knob.
6. Activate the cursor. Use the small FMS knob to select ENHANCED AFCS in the GROUP field and press the ENT key.
7. Highlight the ITEM field. Use the small FMS knob to select the “Enable Enhanced AFCS” option and press the ENT key. Once the option is selected the configuration files in the PRODUCT field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
8. Press the LOAD softkey.
9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
10. View the SUMMARY field and ensure that the item is ‘COMPLETE’.
11. De-activate the cursor.
12. Power down the system and remove the Enhanced AFCS Unlock Card from the PFD.

---

### 3.5.12 Enhanced Search and Rescue (SAR) Reactivation

If the Enhanced SAR option was previously enabled and the G1000 was reconfigured (default GROUP configuration file was loaded), it is necessary to reactivate Enhanced SAR.

Perform this procedure to reactivate Enhanced SAR.

#### **NOTE**

When the Enhanced SAR option is enabled for the first time (normally at the Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate the Enhanced SAR feature in other G1000 systems. The unlock card is forever tied to the specific aircraft in which it was used for the first time. For situations where Enhanced SAR must be re-activated, this card must be used. Reference section 1.6 and the applicable General Arrangement Drawing for Unlock card details.

1. Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
2. A special Enhanced SAR Unlock Card is required to activate this feature. Refer to the appropriate General Arrangement drawing for the correct part number. Insert this card in the upper slot of the PFD.
3. While holding the ENT key on the PFD and MFD, restore power to both displays by closing the PFD and MFD circuit breakers.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the displays, release the ENT key.
5. On the PFD, go to the System Upload page using the FMS knob.
6. Activate the cursor. Use the small FMS knob to select ENHANCED SAR in the GROUP field and press the ENT key.
7. Highlight the ITEM field. Use the small FMS knob to select the “Enhanced Search and Rescue” option and press the ENT key. Once the option is selected the configuration files in the PRODUCT field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
8. Press the LOAD softkey.
9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
10. View the SUMMARY field and ensure that the item is ‘COMPLETE’.
11. De-activate the cursor.
12. Power down the system and remove the Enhanced SAR Unlock Card from the PFD.

---

### 3.5.13 Synthetic Vision and Pathway (SVS) Reactivation

If the SVS option was previously enabled and the G1000 was reconfigured (default GROUP configuration file was loaded), it is necessary to reactivate SVS.

Perform this procedure to reactivate SVS.

#### **NOTE**

When the SVS option is enabled for the first time (normally at the Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate the SVS feature in other G1000 systems. The unlock card is forever tied to the specific aircraft in which it was used for the first time. For situations where SVS must be re-activated, this card must be used. Reference section 1.6 and the applicable General Arrangement Drawing for Unlock card details.

1. Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
2. A special SVS Unlock Card is required to activate this feature. Refer to the appropriate General Arrangement drawing for the correct part number. Insert this card in the upper slot of the PFD.
3. While holding the ENT key on the MFD and PFD displays, restore power by closing the MFD and PFD circuit breakers.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the MFD and PFD displays, release the ENT keys.
5. On the PFD, go to the System Upload page using the FMS knob.
6. Activate the cursor. Use the small FMS knob to select "Configuration Files" in the GROUP field and press the ENT key.
7. Highlight the ITEM field. Use the small FMS knob to select the "Enable SVS Single PFD" option and press the ENT key. Once the option is selected the configuration files in the PRODUCT field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
8. Press the LOAD softkey.
9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
10. View the SUMMARY field and ensure that the item is 'COMPLETE'.
11. De-activate the cursor.
12. Power down the system and remove the SVS Unlock Card from the PFD.

### 3.5.14 Garmin Flight Data Services (GFDS) Reactivation

For previously activated systems, if the GSR 56 satellite receiver unit, GDL 59 datalink unit or G1000 PFD configuration module is replaced, the new unit serial number or new system ID number in the case of the PFD configuration module must be registered with Garmin Flight Data Services. Contact Garmin Product Support and follow the activation procedure as described in this section.

In order to reactivate the optional GDL 59 and optional GSR 56 for Garmin Flight Data Services, contact Garmin Product Support at one of the following numbers (M-F, 7:00 a.m. to 7:00 p.m. Central Standard Time, - Central USA):

- 1.866.739.5687 (toll free in USA)
- +1.913.440.1135 (worldwide)

Have the following information ready prior to calling:

- If activating services for a GSR 56- standalone installation:
  - Aircraft tail number, serial number, manufacturer, and model
  - GSR 56 serial number
  - G1000 system ID number
  - Name of aircraft owner and contact information
  - Credit card information
- If activating services for a GDL 59 and GSR 56 combination installation:
  - Aircraft tail number, serial number, manufacturer, and model
  - GDL 59 serial number
  - GSR 56 serial number
  - G1000 system ID number
  - Name of aircraft owner and contact information
  - Credit card information

Garmin Flight Data Services will provide additional information for activation of data services.

To obtain the G1000 system ID number and unit serial numbers, accomplish the following:

1. On the MFD, turn the large FMS knob to select the AUX page group.
2. Turn the small FMS knob to select the SYSTEM STATUS page. Record the SYSTEM ID number shown in the GROUP field. This number is unique for each G1000 system.

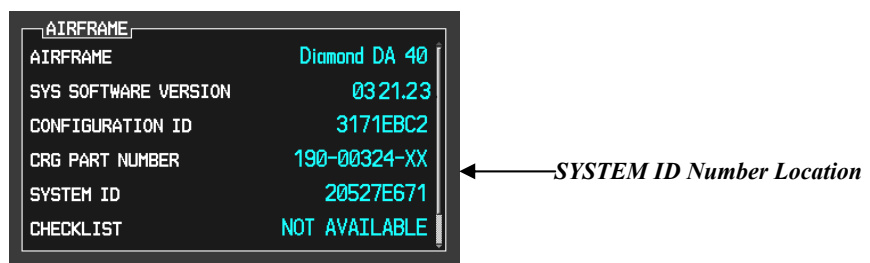


**Figure 3-28. System ID Location**

- 
3. On the MFD, press the LRU softkey to activate the cursor in the LRU INFO field. Use the large FMS knob to scroll the cursor to GDL 59 (if installed). Record the GDL 59 serial number shown in the LRU INFO field.
  4. Use the large FMS knob to scroll the cursor to GSR1 (if installed). Record the GSR 56 serial number shown in the LRU INFO field.

#### ***On Aircraft registration procedures***

1. Position the aircraft outside in a clear unobstructed area for Iridium satellite reception.
2. Using the large FMS knob, select the MAP page group on the MFD. Using the small FMS knob, select the MAP – WEATHER DATALINK (GFDS) page.
3. Press the MENU key on the MFD to display the PAGE MENU window.
4. With the REGISTER WITH GFDS option highlighted, press the ENT key on the MFD to display the GARMIN FLIGHT DATA SERVICE REGISTRATION window.
5. Using the large and small FMS knobs on the MFD, enter the access code (provided by Garmin Product Support during the initial activation of the system) in the NEW REGISTRATION - ACCESS CODE field and press the ENT key on the MFD.

#### **NOTE**

The replacement GDL 59 unit must be registered again, even if the MFD already shows **REGISTERED** in the **STATUS** window.

6. With the REGISTER field highlighted, press the ENT key on the MFD.
7. Verify that the STATUS field indicates REGISTERED and that the data displayed in the CURRENT REGISTRATION field matches the aircraft information.

### 3.5.15 Configuration Module Update

After completing all configuration and software loading procedures, update the PFD configuration module by doing the following procedure, while in configuration mode:

1. With the G1000 powered on in configuration mode, go to the SYSTEM – SYSTEM UPLOAD page on the PFD, as shown:

| PRODUCT         | LRU VERS | CARD VERS | CARD PART NUM | SOFTWARE                            | CONFIGURATION                       |
|-----------------|----------|-----------|---------------|-------------------------------------|-------------------------------------|
| AIRFRAME        |          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| AIRFRAME ALERTS |          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| SYSTEM          |          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| MANIFEST        |          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| MFD_1           |          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| PFD_1           |          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| GIA_1           | T5.10e   | 5.10      | 006-B0544-XX  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| GIA_2           | T5.10e   | 5.10      | 006-B0544-XX  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| WAAS            | 2.4      | 2.4       | 006-B0339-04  | <input type="checkbox"/>            | N/A                                 |
| GMA_PIL         | 3.03     | 3.03      | 006-B0203-33  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

SUMMARY

CHK ALL | CHK SW | CHK CFG | CLR ALL | LOAD | UPDT CFG

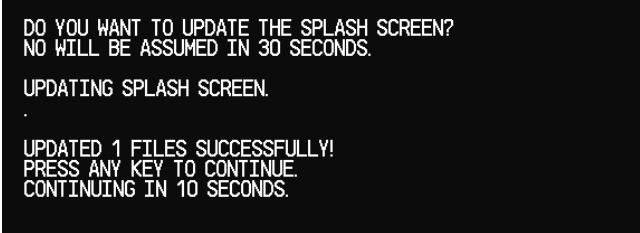
**Figure 3-29. System Upload Page**

2. Press the UPDT CFG softkey, located in the lower right corner of the System Upload page.
3. A prompt will appear: “Update Config Module?”
4. Select YES and press the ENT key on the PFD.
5. The system will update the configuration module located in the PFD connector and prompt the technician when successfully complete. Press the ENT key to acknowledge the prompt.
6. Continue to the MFD Splash Screen loading procedure.

---

### 3.5.16 MFD Splash Screen Loading

1. Insert the G1000 software loader card into the MFD top card slot.
2. Remove power from the G1000 system. Apply power to the MFD by closing the MFD circuit breaker.
3. The MFD will prompt to update system files. Press the CLR key, or the NO softkey.
4. The MFD display may show a prompt listing multiple database verifications on power-up. Next, the MFD will provide a prompt to update the splash screen as shown:

A black rectangular box representing an MFD display. It contains white text. The first section asks 'DO YOU WANT TO UPDATE THE SPLASH SCREEN?' and states 'NO WILL BE ASSUMED IN 30 SECONDS.' The second section says 'UPDATING SPLASH SCREEN.' followed by a single dot. The third section says 'UPDATED 1 FILES SUCCESSFULLY!' and prompts 'PRESS ANY KEY TO CONTINUE. CONTINUING IN 10 SECONDS.'

```
DO YOU WANT TO UPDATE THE SPLASH SCREEN?  
NO WILL BE ASSUMED IN 30 SECONDS.  
  
UPDATING SPLASH SCREEN.  
.  
  
UPDATED 1 FILES SUCCESSFULLY!  
PRESS ANY KEY TO CONTINUE.  
CONTINUING IN 10 SECONDS.
```

5. Press the YES softkey, or press ENT, to update the splash screen image. Verify the prompt UPDATED 1 FILES SUCCESSFULLY! is displayed on the MFD.
6. Follow prompt and press any key to continue. Once the MFD is online, remove the G1000 software loader card and insert into the PFD.
7. Cycle power to the PFD by momentarily opening, then closing the PFD circuit breaker.
8. The PFD will prompt to update system files. Press the CLR key, or the NO softkey.
9. The PFD display may show a prompt listing multiple database verifications on power-up. Next, the PFD will provide a prompt to update the splash screen.
10. Press the YES softkey, or press ENT, to update the splash screen image. Verify the prompt UPDATED 1 FILES SUCCESSFULLY! is displayed on the PFD. The PFD should then boot normally and begin system initialization.
11. Remove power from the PFD and MFD using the respectively labeled breakers.
12. Restore power to the PFD and MFD using the respectively labeled breakers.
13. On the MFD, verify one of the following screens are displayed as appropriate for the loaded configuration.

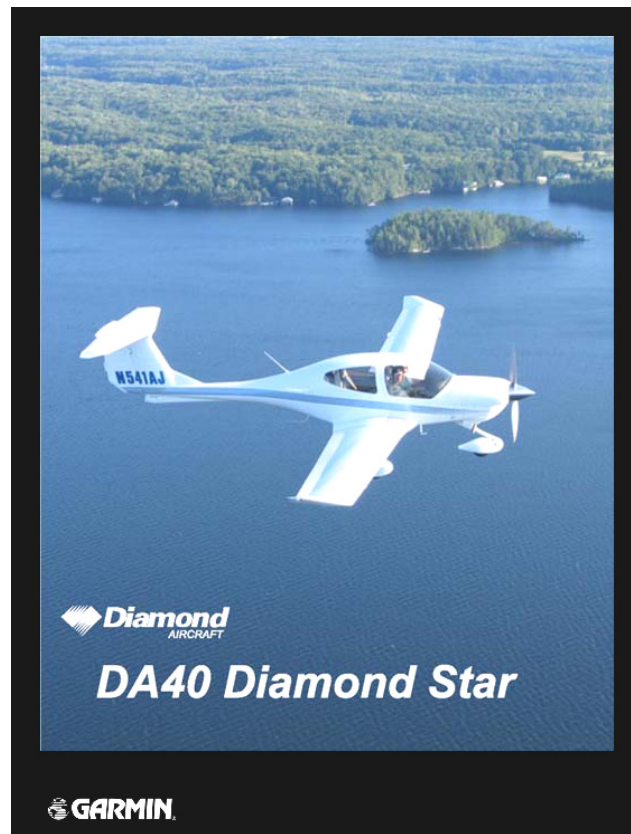


**Figure 3-30. DA40 Splash Screen for Non ESP Configurations**

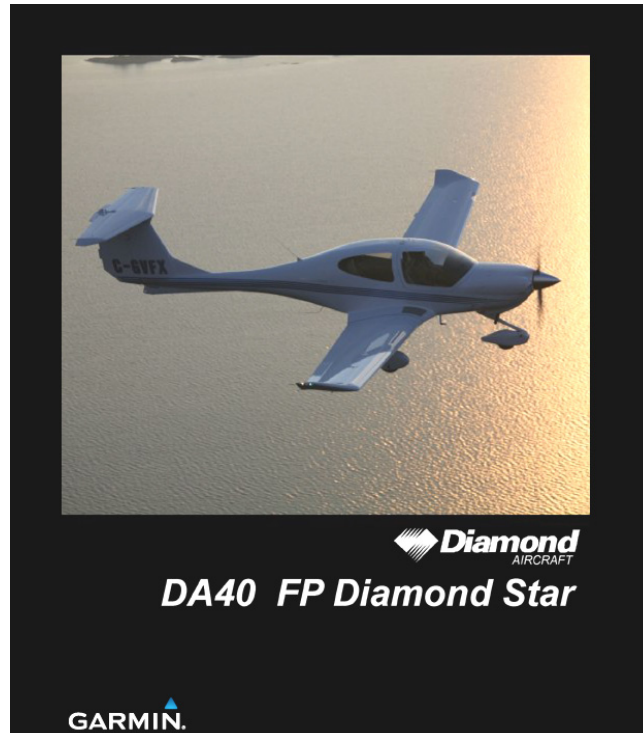


**Figure 3-31. DA40 FP Splash Screen for Non ESP Configurations**

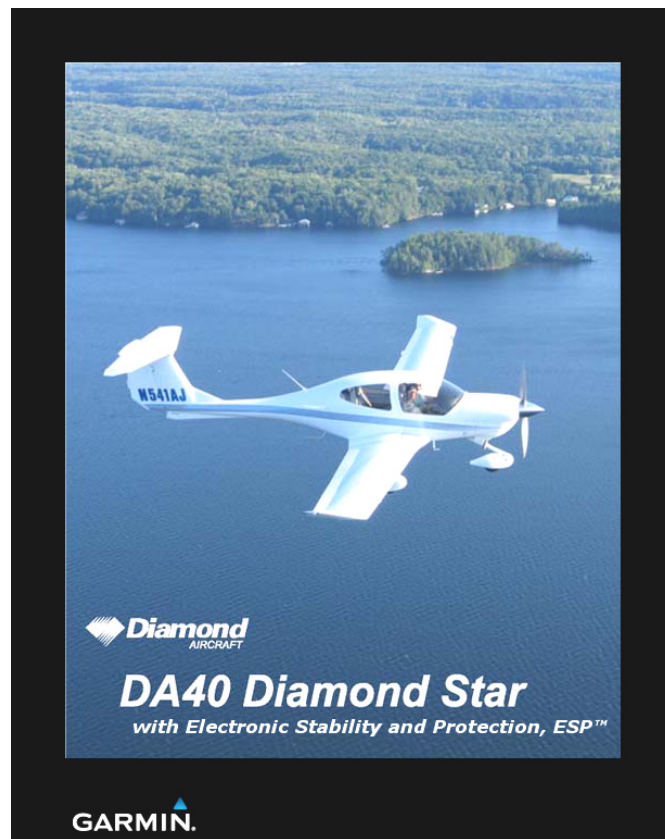


**Figure 3-32. DA40 Splash Screen for ESP Configurations**

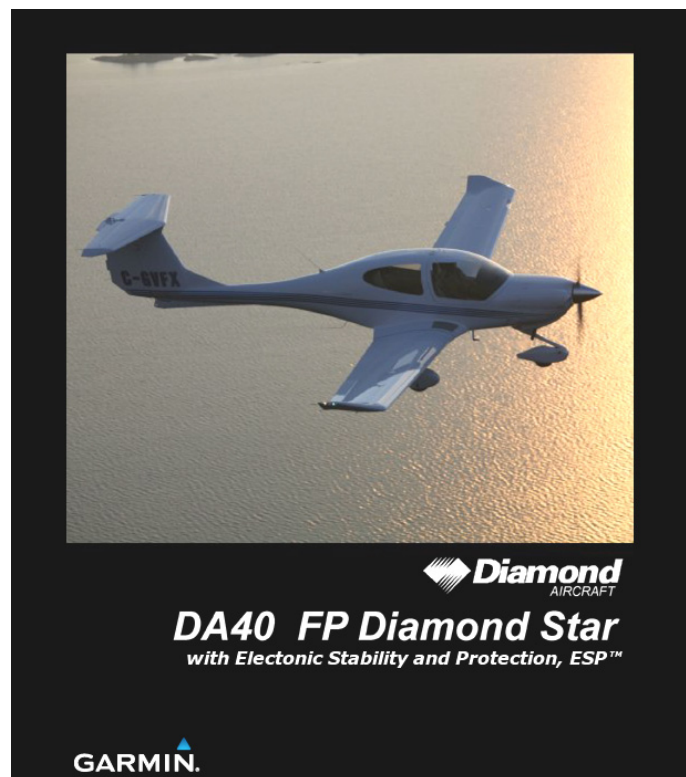


**Figure 3-33. DA40 FP Splash Screen for ESP Configurations**

### 3.5.17 Terrain/Obstacle Database Cards

#### **NOTE**

If the G1000 is to be equipped with the FliteChart or ChartView display options, the appropriate databases are required to be loaded onto the Terrain/Obstacle cards before they are installed in the displays. ChartView database subscription services must be procured directly from Jeppesen and are usually sourced by the aircraft owner. Further, the ChartView feature must be 'unlocked' before the G1000 can use the databases (see 3.5.10).

There is no unlock card for Garmin FliteCharts. A single cycle of Garmin FliteCharts is loaded on the database cards when they are manufactured at Garmin. Additional FliteChart database updates are obtained directly from Garmin's web site and are updated on a periodic basis. The G1000 automatically detects the FliteChart databases and activates the display feature. If the G1000 detects a ChartView database and a FliteCharts database, it will always activate the ChartView database.

1. Remove power from the PFD and MFD using the respectively labeled breakers.
2. Insert the two database cards into the lower slots of the MFD and PFD, respectively. Refer to the appropriate General Arrangement drawing for correct card part numbers.

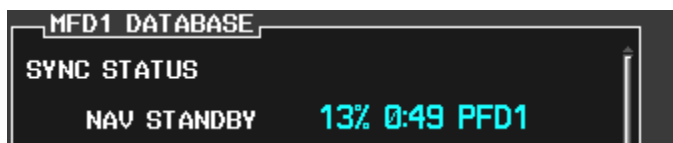
### 3.5.18 Navigation Database Loading

Follow this procedure to load the navigation database:

1. Remove power from the PFD and MFD.
2. Insert an SD card containing the latest cycle Jeppesen navigation database (data supplied by Jeppesen) into the top slot of the MFD.
3. Apply power to the PFD and MFD. A prompt similar to the following will be displayed on the MFD:

DO YOU WANT TO UPDATE THE STANDBY NAVIGATION DATABASE ON THE BOTTOM CARD?  
THE STANDBY DATABASE WILL BE ACTIVATED UPON THE FIRST ON-GROUND POWER CYCLE ON OR  
AFTER 00:00 SYSTEM TIME ON THE EFFECTIVE DATE.

4. Select the **YES** softkey to confirm the standby navigation database update.
5. After the database is updated, a prompt similar to the following will be displayed on the MFD:  
DO YOU WANT TO UPDATE THE ACTIVE NAVIGATION DATABASE?  
SELECTING YES WILL OVERWRITE THE ACTIVE NAVIGATION DATABASE.
6. Select the **NO** softkey.
7. The system will synchronize and automatically update as necessary. Monitor the synchronization process on the AUX – SYSTEM STATUS page in the SYNC STATUS sub-section within the DATABASE window. This sub-section is only present when a sync is occurring or has occurred on the current power cycle.



- 
8. If an error occurs during synchronization, one of the following messages will be displayed followed by the affected GDU:

**Err No Space** - SD card does not contain sufficient memory

**Timeout** – system timed-out prior to the database transfer completing

**Canceled** - an active synchronization has been cancelled due to the **SYNC DBS** softkey being unselected

**Err** – displayed for all other errors

Note that a power cycle is required to restart synchronization when 'Err No Space' or 'Err' is shown.

9. When the synchronization is complete, the status is shown as 'Complete'.
10. Cycle power to the PFD and MFD.
11. On the AUX – SYSTEM STATUS page, press the **MFD1 DB** softkey. Scroll through all of the databases contained in the MFD and confirm that the correct databases are loaded.
12. Press the **MFD1 DB** softkey again to toggle to **PFD1 DB**. Scroll through all of the databases contained in the PFD1 and confirm that the correct databases are loaded.
13. Remove the navigation database update card from the MFD.

### 3.5.19 Clearing Default User Settings

1. Remove power from PFD and MFD by pulling the PFD and MFD circuit breakers.
2. While holding the **CLR** button on PFD, reset PFD circuit breaker.
3. When prompted to clear user settings, select the YES softkey
4. While holding the **CLR** button on the MFD, reset the MFD circuit breaker.
5. When prompted to clear user settings, select the YES softkey.

## 4 Instructions for Continued Airworthiness

### 4.1 Airworthiness Limitations

The G1000 integrated cockpit is airworthy when installed, configured, and maintained in accordance with this section.

#### **NOTE**

Throughout this manual, use of the term 'Hours' is made in reference to aircraft flight hours.

The G1000 and GFC 700 systems possess the following maintenance airworthiness limitations:

#### G1000:

- Every 24 calendar months, replace all lightning protection 3.2 Amp slow-blow fuses. There are five total fuses in the following locations:
  - Two fuses mounted behind the instrument panel, near the circuit breaker panel. Each fuse is wired inline with a voltage suppressor.
  - Three fuses mounted on the field-fabricated lightning protection component block, which is attached to the forward portion of the remote avionics enclosure. Each fuse is mounted to the side of the block, and each is labeled.

Replacement consists of twisting each fuse holder cap counter-clockwise, removing each fuse and replacing with a new fuse. Refer to Section 4.12.

- For aircraft equipped with system software version 0321.23 or later, every **250** hours or Aircraft Annual Inspection, whichever comes first, perform an operational check of the avionics cooling fans and verify correct operation of the 'PFD FAN FAIL', 'MFD FAN FAIL', and 'GIA FAN FAIL' caution alerts. Refer to Section 4.13.

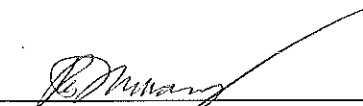
#### GFC 700:

- Every 100 hours or Aircraft Annual Inspection, whichever comes first, perform a check to verify that flap-in-motion discrete inputs function correctly. Refer to Section 4.9.
- For aircraft equipped with GSM 86 servo gearboxes, every 1200 hours or 36 months, whichever comes first, conduct a check of the slip clutch torque setting in accordance with section 4.10.2.

There are no other maintenance airworthiness limitations associated with this type design change. The G1000/DA 40 Airplane Flight Manual Supplement defines all operating limitations for this STC.

**The Airworthiness Limitations section is FAA-approved and specifies maintenance required under §§ 43.16 and 91.403 of Title 14 of the Code of Federal Regulations, unless an alternative program has been FAA-approved.**

FAA APPROVED

  
Robert Murray  
ODA STC Unit Administrator  
ODA-240087-CE

Date

5/16/2013

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## 4.2 Servicing Information

G1000 LRU maintenance is 'on condition' only. No component-level overhaul is required for this type design change.

### 4.2.1 On Condition Servicing

'On Condition' replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities defined in Section 5 of this manual. Replacement and/or servicing should be made only after the technician troubleshoots the system to the extent determined necessary by using the guidance in this manual along with common avionics maintenance practices.

#### **IMPORTANT!**

It is impossible to provide guidance for every conceivable failure scenario within the scope of this manual. Every effort has been made to provide comprehensive guidance for possible failures. The information in this document should always be combined with common sense and a thorough knowledge of the system. Use sound avionics maintenance practices when working around or on G1000 equipment.

The remainder of this document is organized in the following fashion:

- Section 4.3 lists maintenance requirements related to the G1000 system.
- Section 6 gives instructions regarding the removal and replacement of physical G1000 equipment and parts.
- Section 7 gives configuration and testing instructions to be accomplished if G1000 equipment or parts are removed/replaced.
- Section 8 specifies system return-to-service procedures.

The beginning of Section 6 provides instructions to check the software part number and version of each LRU before removing a unit. Procedures in Section 7 require the same check after LRU replacement and software loading.

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## 4.2.2 Recommended Tools

The following tools are needed to perform maintenance tasks on G1000 equipment:

- Milli-ohm Meter, OR
  - ✓ Ammeter capable of measuring up to three (3) amps current
  - ✓ Power Supply capable of providing at least one (1) amp current and has an adjustable current limiter
- Voltmeter capable of measuring 0-32 Volts DC
- #2 Phillips Screwdriver
- 3/32" Hex Tool
- Digital Level with 0.25 degrees of accuracy capability  
(Required for AHRS 'Procedure A' Calibration)
- A VHF NAV/COM/ILS ramp tester or equivalent
- A transponder ramp tester or equivalent
- A pitot/static ramp tester
- Outdoor line-of-site to GPS satellite signals or GPS indoor repeater
- Headset/Microphone
- Ground Power Unit (Capable of supplying 28 Vdc)
- Flight Control Cable Tension Meter or equivalent
- Servo Mount Slip Clutch Adjustment Tool – Garmin P/N T10-00110-01
- Calibrated Torque Wrench capable of measuring 0 – 70 in/lbs
- Standard Sockets & Wrenches (3/8", 9/16", and 13/16")
- Calibrated Weighing Scale able to display to the nearest hundredth (for use during fuel probe calibration)
- Thermometer (for air data OAT probe temperature comparison)

## 4.2.3 Total Time In Service Timer

Effective System Software Version 0369.06 and later, the G1000 now stores a time-in-service value and displays this time on the MFD EIS window. To access the timer, press the ENGINE softkey, then press the SYSTEM softkey. Time-in-service is determined by on-ground and off-ground states within the G1000. When the aircraft is determined to be airborne, the timer starts. The time is not resettable in the field. If the time is zeroed out or changed due to software loading or display swapping between aircraft, a logbook entry is recommended to document the time-in-service change.

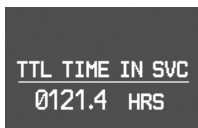


**Figure 4-1. Total Time In Service**

### **NOTE**

The time in service value on the MFD is not intended to be used as airframe total time in service indication.

### 4.3 Maintenance Intervals

The following table shows systems and items that must undergo tests or checks at specific intervals. If the interval is shown to be in flight time as well as calendar months, the first interval reached should be used as the limit.

Those tasks shown in Table 4-1 in **bold text** are airworthiness limitations.

**Table 4-1. Maintenance Intervals**

| Item                                          | Description/Procedure                                                             | Manual Section No. | Interval                |
|-----------------------------------------------|-----------------------------------------------------------------------------------|--------------------|-------------------------|
| <b>G1000 Equipment</b>                        |                                                                                   |                    |                         |
| G1000 System                                  | Complete Visual Inspection.                                                       | 4.4                | Aircraft Annual         |
| GDU 1040 PFD &<br>GDU 1040, 1042, or 1044 MFD | Removal & Replacement.                                                            | 6.1                | On Condition            |
|                                               | GDU Power Interrupt Function Check.                                               | 4.11               | Aircraft Annual         |
| GMA 1347                                      | Removal & Replacement.                                                            | 6.2                | On Condition            |
| GIA 63(W) IAU (Qty.2)                         |                                                                                   | 6.3                |                         |
| GEA 71 EAU                                    |                                                                                   | 6.4                |                         |
| GTX 33 Mode S Transponder                     | Removal & Replacement.                                                            | 6.5                | 24 Calendar Months      |
|                                               | Test according to Title 14 CFR §91.411 and §91.413 as well as Part 43 Appendix F. | 7.5                |                         |
| GDC 74A                                       | Removal & Replacement.                                                            | 6.5.1              | On Condition            |
|                                               | Test according to Title 14 CFR §91.411 and Part 43 Appendix E.                    | 7.6                | 24 Calendar Months      |
|                                               | Airspeed Function Test.                                                           |                    | 2000 Hours or 48 Months |
|                                               | Vertical Speed Function Test.                                                     |                    | 2000 Hours or 48 Months |
| GRS 77 AHRS                                   | Removal & Replacement.                                                            | 6.7                | On Condition            |
|                                               | Magnetic variation database update.                                               | 4.7                |                         |
| GMU 44 Magnetometer                           | Removal & Replacement.                                                            | 6.8                |                         |
| GDL 69/69A (If Installed)                     |                                                                                   | 6.9                |                         |
| GA 35 GPS/WAAS Antennas                       | Removal & Replacement; Refer to Table 1-2, for installation drawings.             | 6.14               |                         |
| GDL 59 Datalink                               | Removal & Replacement.                                                            | 6.15               |                         |
| GSR 56 Satellite Receiver                     |                                                                                   | 6.16               |                         |
| Iridium Antenna (If Installed)                | Removal & Replacement; Refer to Table 1-2, for installation drawings.             | 6.17               |                         |
| Wi-Fi Antenna (If Installed)                  |                                                                                   | 6.18               |                         |

**Table 4-1. Maintenance Intervals, Cont.**

| <b>G1000 Accessories</b>                                           |                                                                                                                                                                   |                           |                                     |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|
| <b>Item</b>                                                        | <b>Description/Procedure</b>                                                                                                                                      | <b>Manual Section No.</b> | <b>Interval</b>                     |
| Configuration Module Replacement (Qty 4)                           | Removal & Replacement.                                                                                                                                            | 6.12                      | On Condition                        |
| GEA 71 Backshell Thermocouple                                      | Removal & Replacement.                                                                                                                                            | 6.13                      |                                     |
| OAT Probe                                                          | Removal & Replacement.                                                                                                                                            | 6.6                       |                                     |
| PFD, MFD, & GIA Cooling Fans (Qty 3)                               | Removal & Replacement; Refer to G1000/DA40 Installation Drawing, 005-00304-00.                                                                                    | N/A                       |                                     |
|                                                                    | <b>Cooling Fan Function and Fan Failure Annunciation Test.</b>                                                                                                    | <b>4.13</b>               | <b>250 Hours or Aircraft Annual</b> |
| <b>GFC 700 AFCS</b>                                                |                                                                                                                                                                   |                           |                                     |
| GFC 700 AFCS System                                                | Complete Visual Inspection                                                                                                                                        | 4.4                       | Aircraft Annual                     |
| GSA 81 Servos (all)                                                | Removal & Replacement. Refer to the servo install drawings listed in Table 1-3.                                                                                   | 6.10                      | On Condition                        |
|                                                                    | Clean and Apply Grease to Output Gears.                                                                                                                           | 4.8                       | 1000 Hours or 36 Months             |
| GSM 85 Servo Mounts (all)                                          | Removal & Replacement. Refer to the servo install drawings listed in Table 1-3.                                                                                   | 6.11                      | On Condition                        |
|                                                                    | <b>Check Slip Clutch Torque</b>                                                                                                                                   | <b>4.10.1</b>             | <b>500 Hours or 12 Months</b>       |
| GSM 86 Servo Mounts (all)                                          | Removal & Replacement. Refer to the servo install drawings listed in Table 1-2                                                                                    | 6.11                      | On Condition                        |
| GSM 86 Servo Gear Box Slip Clutch Torque Check                     | Conduct an manual overpower of the servo to ensure it is not mechanically jammed                                                                                  | 4.10.4                    | Aircraft Annual                     |
|                                                                    | <b>For installations with the GSM 86 servo gearbox, verify that the pitch, roll and pitch trim GSM 86 slip clutch torque values are within acceptable limits.</b> | <b>4.10.2</b>             | <b>1200 Hours or 36 Months</b>      |
| GFC 700 AFCS System                                                | <b>Perform a check to verify that flap-in-motion discrete inputs function correctly.</b>                                                                          | <b>4.9</b>                | <b>100 Hours or Aircraft Annual</b> |
| Pitch Trim Control Chain                                           | Removal & Replacement; Refer to the pitch trim installation drawing listed in Table 1-2 and or Table 1-3.                                                         | N/A                       | On Condition                        |
| Pitch & Roll Control Cable/Phenolic Isolator Assemblies and Clamps | Removal & Replacement; Refer to the pitch and roll servo installation drawings listed in Table 1-2 or Table 1-3.                                                  | N/A                       | On Condition                        |

**Table 4-1. Maintenance Intervals, Cont.**

| Item                              | Description/Procedure                                                                                                                                                                                                                                                                                                                                                                | Manual Section No. | Interval                                                |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------|
| <b>G1000 Lightning Protection</b> |                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                         |
| <b>G1000 System</b>               | <b>Replace all lightning protection 3.2 Amp slow-blow fuses.</b>                                                                                                                                                                                                                                                                                                                     | <b>4.12</b>        | <b>24 months</b>                                        |
| GIA / AHRS Resistors              | Replace all 3 resistors located on the front of the remote avionics enclosure. Refer to G1000/DA40 Installation Drawing, 005-00304-00.<br><br><u>For WAAS aircraft:</u><br><br>In addition to the above 3 resistors, replace all 7 resistors located on the resistor bracket installed on the side of the remote avionics enclosure. See the Resistor Install Drawing, 005-00400-12. | N/A                | Replace After Suspected / Actual Lightning Event        |
| TVS Unit Replacement (Qty 7)      | Replace all five voltage suppressor units.<br><br>Refer to G1000/DA40 Installation Drawing, 005-00304-00:<br><br>✓ Battery, Alternator, GMA 1347, and Standby Attitude Indicator Voltage Suppressors are located behind instrument panel near the circuit breakers.<br><br>✓ GIA1, GIA2, and AHRS Voltage Suppressors are located at the remote avionics enclosure.                  | N/A                | Replace After Suspected / Actual Lightning Event        |
| Visual Inspection                 | Complete Visual Inspection.                                                                                                                                                                                                                                                                                                                                                          | 4.4                | After Suspected / Actual Lightning Event                |
| Electrical Bonding Test           | Perform an electrical bonding resistance check of all G1000 equipment.                                                                                                                                                                                                                                                                                                               | 4.5                | 1000 Hours and After Suspected / Actual Lightning Event |

**Table 4-1. Maintenance Intervals, Cont.**

| Item                                                             | Description/Procedure                                                                                                                                                                                                                                                   | Manual Section No. | Interval     |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|
| <b>Engine/Airframe Sensors</b>                                   |                                                                                                                                                                                                                                                                         |                    |              |
| MAP Sensor (DA40 ONLY)                                           | Removal & Replacement:<br><u>For DA 40 Aircraft:</u><br><br>Refer to the G1000/DA40 Installation Drawing, 005-00304-00 for drawings (Ref STC #SA01254WI-D).<br><br><u>For DA 40 F Aircraft:</u><br><br>Refer to the Diamond Airplane Maintenance Manual and OAM 40-222. | N/A                | On Condition |
| Oil Pressure Sensor                                              |                                                                                                                                                                                                                                                                         |                    |              |
| Oil Temperature Sensor                                           |                                                                                                                                                                                                                                                                         |                    |              |
| Fuel Pressure Sensor (DA40 ONLY)                                 |                                                                                                                                                                                                                                                                         |                    |              |
| Tach Sensor                                                      |                                                                                                                                                                                                                                                                         |                    |              |
| Fuel Flow Sensor                                                 |                                                                                                                                                                                                                                                                         |                    |              |
| CHT Probes (Qty 4)                                               |                                                                                                                                                                                                                                                                         |                    |              |
| EGT Probes (Qty 4)                                               |                                                                                                                                                                                                                                                                         |                    |              |
| Alternator Current Sensor                                        |                                                                                                                                                                                                                                                                         |                    |              |
| Fuel Tank Quantity Sending Units – G1000 Fuel Tank Recalibration | Should one or both fuel quantity transducers fail, replace according to instructions in Diamond DA 40 Aircraft Maintenance Manual. The new replacement fuel quantity probe(s) must be re-calibrated.                                                                    | 4.6                |              |

## 4.4 Visual Inspection

Perform a visual inspection every aircraft annual. Check for corrosion, damage, or other defects for each of the items listed in Table 4-2. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors. Follow guidance in Section 6 for equipment removal and replacement. Refer to the Diamond DA 40 Airplane Maintenance Manual for instructions on removing any access panels.

**Table 4-2. Visual Inspection Procedure**

| Item                                                                                                                                          | Description/Procedure                                                                                                                                                                                                                                | Initials |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Exterior Inspection                                                                                                                           |                                                                                                                                                                                                                                                      |          |
| GA35 GPS/WAAS Antennas                                                                                                                        | a) Conduct a visual inspection of the GPS antennas. Verify there are no cracks in the antennas and there is no deformation in the surrounding mounting structure.<br>b) Verify that the fillet seals around the antenna bases are in good condition. |          |
| GTP 59 OAT Probe                                                                                                                              | a) Conduct a visual inspection of the OAT probe. Verify the probe is mounted securely and that there are no visible defects such as deep scratches or cracks.<br>b) Ensure no deformation is present in the surrounding mounting structure.          |          |
| To gain access for the following inspections:                                                                                                 |                                                                                                                                                                                                                                                      |          |
| 1. Remove the instrument panel cover as described in the DA 40 Aircraft Maintenance Manual.                                                   |                                                                                                                                                                                                                                                      |          |
| GDC 74A Air Data Computer                                                                                                                     | a) Visually inspect the GDC 74A unit, mount, and connector for corrosion or other defects.<br>b) Ensure that pitot/static plumbing is secure and in good condition.                                                                                  |          |
| GEA 71 Engine/Airframe Unit                                                                                                                   | a) Inspect the GEA 71 unit, rack, and connectors for corrosion or other defects.                                                                                                                                                                     |          |
| Battery, Alternator, GMA 1347, and Backup Attitude Indicator Voltage Suppressors (4)                                                          | a) Inspect both voltage suppressors and associated wiring for cracks, chaffing, or other defects.<br>b) Remove each voltage suppressor fuse and inspect the fuse filament. Ensure that the fuse is in good condition.                                |          |
| GDU Fans                                                                                                                                      | a) Inspect both GDU fans, fan mounts, and connectors for corrosion, accumulation of dirt or other damage. Remove excess dirt as required.<br>b) Perform fan operation and annunciation test per Section 4.13.                                        |          |
| GDU 1040 PFD & GDU 1042 MFD                                                                                                                   | a) Remove the MFD and PFD as described in Section 6.1.<br>b) Inspect the mounting surface, copper bonding fingers and connector for corrosion, heavy oxidation, or other damage.<br>c) Reinstall the MFD and PFD.                                    |          |
| To gain access for the following Inspections:                                                                                                 |                                                                                                                                                                                                                                                      |          |
| 1. Remove rear baggage compartment floor.<br>2. Detach seat belts.<br>3. Remove baggage compartment shell.<br>4. Remove Rear Passenger Seats. |                                                                                                                                                                                                                                                      |          |
| Refer to the DA 40 Aircraft Maintenance Manual for removal instructions.                                                                      |                                                                                                                                                                                                                                                      |          |

**Table 4-2. Visual Inspection Procedure, Cont.**

| Item                                                | Description/Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Initials |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| GFC 700<br>Equipment                                | <p>a) Inspect the servos, servo mounts, connectors, support structures, and control cables to ensure that no corrosion, chaffing, cracks, or other defects exist.</p> <p>b) Have an assistant manually move the ailerons (for roll servo), elevators (for pitch servo) and elevator trim wheel (for pitch trim servo) from stop to stop and visually observe the servo, servo mount, and control cabling/chain. Ensure there is no binding in the control cabling or chain, and that the capstan/sprocket rotates freely.</p> <p>c) Check the servo control cables to ensure no fraying, corrosion, or other damage exists. If the condition of the cable is questionable, replace it with a new one.</p> <p>d) Check the tension of the pitch and roll control cables and the pitch trim chain. Refer to the following servo installation drawings for cable and chain tension specifications:</p> <p><b>GSM 85 Installations;</b></p> <p>a) <u>005-00336-18: Roll Servo Install Drawing</u></p> <p>b) <u>005-00336-17: Pitch Servo Install Drawing</u></p> <p>c) <u>005-00336-19: Pitch Trim Servo Install Drawing</u></p> <p><b>GSM 86 Installations;</b></p> <p>a) <u>005-00400-92: Instl,Pitch Servo,GFC700 with GSM 86, Diamond DA40/40F</u></p> <p>b) <u>005-00400-94: Instl,Roll Servo,GFC700 with GSM 86, Diamond DA40/40F</u></p> <p>c) <u>005-00400-93: Instl,Pitch Trim Servo,GFC700 with GSM 86, Diamond DA40/40F</u></p> <p>e) Ensure that each cable is correctly attached to the clamps, and that the chain is secure on the sprockets.</p> <p>f) Follow Diamond's recommended checks for checking main control rods, following the instructions in Chapter 27, Flight Controls, of the Diamond Airplane Maintenance Manual.</p> <p>g) Inspect the servo wiring and ensure no chaffing, wear, or other damage exists.</p> |          |
| GRS 77                                              | <p>a) Inspect the GRS 77 unit, rack, and connector for corrosion or other defects.</p> <p>b) Inspect both braided ground straps to the GRS rack and ensure they are in good condition.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |
| Iridium and Wi-Fi<br>Antennas<br><br>(If Installed) | <p>a) Inspect the Iridium and Wi-Fi antennas and associated mounting hardware. Ensure the antennas and brackets are securely fastened to the aircraft structure. Inspect the hardware for evidence of corrosion, cracking, or other damage.</p> <p>b) Inspect antenna coaxial cabling and connectors for chaffing, wear, or other damage.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |

**Table 4-2. Visual Inspection Procedure, Cont.**

| Item                                                                                                                                                                                                                                                       | Description/Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Initials |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Remote Avionics Enclosure                                                                                                                                                                                                                                  | a) Inspect the outer area around the enclosure for damage.<br>b) Inspect the antenna connection junction.<br>c) Inspect the aluminum ground strap.<br>d) Inspect the GIA/AHRS voltage suppressors, resistors, and fuses mounted to the front of the enclosure (refer to 005-00304-00 for drawings):<br>i. Inspect each voltage suppressor and associated wiring for cracks, chaffing, or other defects.<br>ii. Remove each voltage suppressor fuse and inspect the fuse filament. Ensure that each fuse is in good condition.<br>iii. Inspect each lightning protection resistor and associated wiring for cracks, chaffing, or other defects.<br>e) Loosen the screws securing the top half of the avionics enclosure.<br>f) Remove the top half of the enclosure and inspect the bottom mounting tray and all connectors.<br>g) Reinstall the top avionics enclosure.<br>h) <u>For WAAS aircraft:</u> Inspect resistor bracket assembly and wiring harness for cracks, chaffing, or other defects. Remove resistor bracket assembly if necessary, to inspect wiring, shields, resistors, and cable ties. |          |
| GIA Avionics Fan                                                                                                                                                                                                                                           | a) Inspect remote avionics fan, fan mount, and connector for corrosion, dirt accumulation and other damage. Remove excess dirt as required.<br>b) Perform fan operation and annunciation test per Section 4.13.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |
| If no other maintenance is to be performed, reinstall the rear baggage compartment, compartment floor, seat belts and rear passenger seats. Refer to the DA 40 Aircraft Maintenance Manual for reinstallation instructions.                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |
| Gain access to the GMU 44 for the following inspection by removing the three Phillips screws holding the GMU access plate to the wing. Be sure to use a non-magnetic screwdriver to avoid harming the GMU. The GMU 44 is mounted below the starboard wing. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |
| GMU 44                                                                                                                                                                                                                                                     | a) Carefully lower the assembly and inspect the GMU 44 and rack.<br>b) Inspect the mounting hardware and GMU 44 for corrosion or other damage.<br>c) Reinstall the GMU 44 beneath the wing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |

**IMPORTANT!**

For all other equipment installed under this STC listed in this maintenance manual, use the inspection procedures set forth in Chapter 05 of the DA40 Airplane Maintenance Manual.

---

## 4.5 Electrical Bonding Test

The airframe bonding test is described in the DA40 AMM in Section 51-80-00 on Page 201. The following bonding test is provided for G1000-equipped DA 40 aircraft as a requirement beyond what is given in Section 51-80-00.

### 4.5.1 Requirements

All G1000 equipment must be installed. Remove the instrument panel cover, baggage compartment floor, and baggage compartment to gain access to required areas. Remove the co-pilot seat to gain access to the OAT probe base, following instructions in the DA 40 AMM.

### 4.5.2 Test Equipment

A milli-ohm meter and Kelvin probes are recommended for this test. However, a standard voltmeter, power supply with adjustable current limit, and ammeter may be substituted. The following procedure is written using the voltmeter, power supply and ammeter. All test equipment must have valid calibration records.

### 4.5.3 Procedure

1. Connect the positive lead of the power supply to the engine compartment grounding bracket (battery negative connection to the airframe). Connect/touch the positive lead of the voltmeter to the same point.

#### **NOTE**

Ensure that the voltmeter and power supply probes do not touch, so as not to induce contact resistance.

2. Touch negative lead of power supply to each of the test points listed while performing Step 3. At each point, configure the power supply to produce 1 amp before measuring voltage (use an ammeter to ensure current is within 1 amp  $\pm$ 100 milli-amp at each point).
3. Set the voltmeter to measure milli-volts and null the reading. Measure the voltage from the engine grounding bracket (step 1) to each of the following points and record the voltage (perform Step 2 at each point to ensure that 1 amp  $\pm$ 100 milli-amp is present before measuring):
  - a) Top metal case of PFD: \_\_\_\_\_ milli-volts
  - b) Top metal case of MFD: \_\_\_\_\_ milli-volts
  - c) Top metal case of GMA 1347: \_\_\_\_\_ milli-volts
  - d) GEA 71 Body: \_\_\_\_\_ milli-volts
  - e) GDC 74A Body: \_\_\_\_\_ milli-volts
  - f) OAT Probe Base Nut (inside fuselage): \_\_\_\_\_ milli-volts
  - g) GIA 1 Top: \_\_\_\_\_ milli-volts
  - h) GIA 2 Top: \_\_\_\_\_ milli-volts
  - i) GTX 33 Top: \_\_\_\_\_ milli-volts
  - j) GRS 77 metal base: \_\_\_\_\_ milli-volts
  - k) Resistor Bracket Top (WAAS only): \_\_\_\_\_ milli-volts
  - l) GMU 44 metal base: \_\_\_\_\_ milli-volts
  - m) GDL69 Top: \_\_\_\_\_ milli-volts
  - n) GDL59 Top: \_\_\_\_\_ milli-volts

- 
- o) GSR 56 Top: \_\_\_\_\_ milli-volts
  - p) Iridium Antenna metal base \_\_\_\_\_ milli-volts
  - q) GSA 81 (Pitch) Servo Body: \_\_\_\_\_ milli-volts
  - r) GSA 81 (Pitch Trim) Servo Body: \_\_\_\_\_ milli-volts
  - s) GSA 81 (Roll) Servo Body: \_\_\_\_\_ milli-volts

Ensure that at each test point, no more than 2.5 mV ( $\approx 2.5 \text{ m}\Omega$ ) are present. In this case, voltage is approximately equivalent to resistance ( $\Omega$ ), given that precisely 1 amp reference current is present.

#### **NOTE**

If 1 amp reference current cannot be maintained, note the difference between the attainable current and 1 amp reference current. Calculate the percentage difference and apply this to the voltage reading to obtain the equivalent resistance. Example: If the measured current is 1.2 amps, (20% high from the target 1 amp current), then the allowable voltage measurement would be 20% high, 2.5 mV would now be 3.0 mV.

---

## 4.6 Fuel Tank Probe Re-Calibration

The G1000 in the DA40 uses digital fuel probes to provide fuel quantities. The fuel probes interface to the GEA 71 where the data is received and sent to the displays for additional processing. In the PFD and MFD, the raw fuel probe data is processed against a set of calibration points, in order to display an accurate fuel indication. Due to the design of the fuel probes, the precise measurement of fuel quantity varies from probe to probe. It is therefore necessary to have specific calibration points for the specific probes installed in the aircraft.

### **NOTE**

Although the total fuel quantity for long range tanks is 24 gallons usable fuel, the method of fuel quantity processing in the DA40's G1000 system only has a raw calibration total of 20.95 gallons for the LEFT long range tank and 21.17 gallons for the RIGHT long range tank when both probes are at their ceilings. However, this does not affect the actual display to the pilot, which correctly shows 24 gallons on the MFD.

These calibration points allow precise display of fuel quantities at the low-to-empty end of the probes. The EMPTY and 5 GAL points could be recalibrated as necessary by following this procedure, should the fuel probe ever drift over time, or require replacement.

### **NOTE**

It is **MANDATORY** to recalibrate a replacement fuel probe.

If the fuel quantity probe is replaced or is in need of adjustment, before proceeding with the re-calibration procedures in this section the aircraft fuel calibration may possibly need to be reconfigured. This requirement will apply to both standard and long-range fuel tanks.

1. If not already in configuration mode, restart the PFD in configuration mode by pulling, then resetting, the PFD circuit breaker while holding the ENT key.
2. Go to the CAL Page Group on the PFD. The FUEL TANK CALIBRATION page should be displayed.
3. FUEL TANK CALIBRATION page is not displaying the Calibration Table method as shown in Figure 4-2, proceed to 4.6.1 to reload the Calibration Table fuel calibration files to enable the Calibration Table method. **Re-calibration of both tanks is necessary the first time the calibration files are reloaded to upgrade to the Calibration Table method of fuel calibration.**
4. If the Calibration Table configuration is loaded as shown in Figure 4-2, proceed to 4.6.2 for the fuel probe re-calibration procedure. **Only the replaced fuel probe requires re-calibration for this configuration.**

| FUEL TANK CALIBRATION                                                                                                                                                                                                        |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                 |                  |        |         |        |          |         |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------|------------------|--------|---------|--------|----------|---------|----------|
| <b>FUEL FLOW</b><br>ENG 1 SCALE 1.00000<br>ENG 2 SCALE 1.00000<br><b>FUEL TEMP L</b><br>OFFSET -----<br>RAW VAL ----- °F<br>CAL VAL 32.000 °F<br><b>FUEL TEMP R</b><br>OFFSET -----<br>RAW VAL ----- °F<br>CAL VAL 32.000 °F |                  | <b>FUEL CALIBRATION POINTS</b><br>CURRENT TANK LEFT FUEL UNITS GALLONS(GL./HR)<br><b>SENSOR LIMITS</b><br>LEFT 1 FLOOR 0.00000<br>LEFT 1 CEILING 58.05999<br>LEFT 2 FLOOR 0.00000<br>LEFT 2 CEILING 21.23483<br>LEFT 3 FLOOR 0.00000<br>LEFT 3 CEILING 0.00000<br>LEFT 4 FLOOR 0.00000<br>LEFT 4 CEILING 0.00000<br>LEFT 5 FLOOR 0.00000<br>LEFT 5 CEILING 0.00000<br><b>SENSOR INPUTS</b><br>LEFT 1 18.94685<br>LEFT 2 0.14149<br>LEFT 3 -----<br>LEFT 4 -----<br>LEFT 5 -----<br>ACTUAL FUEL QUANTITY 5.00GL<br>CALIBRATION VALUE 19.08834<br><input type="button" value="CALIBRATE?"/><br><b>CALIBRATION TABLE</b><br><table border="1"> <thead> <tr> <th>ACTUAL QUANTITY</th> <th>CALIBRATED VALUE</th> </tr> </thead> <tbody> <tr> <td>0.00GL</td> <td>0.00000</td> </tr> <tr> <td>5.00GL</td> <td>19.20968</td> </tr> <tr> <td>20.95GL</td> <td>79.29482</td> </tr> </tbody> </table> CALIBRATED TOTAL 5.00GL |  | ACTUAL QUANTITY | CALIBRATED VALUE | 0.00GL | 0.00000 | 5.00GL | 19.20968 | 20.95GL | 79.29482 |
| ACTUAL QUANTITY                                                                                                                                                                                                              | CALIBRATED VALUE |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                 |                  |        |         |        |          |         |          |
| 0.00GL                                                                                                                                                                                                                       | 0.00000          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                 |                  |        |         |        |          |         |          |
| 5.00GL                                                                                                                                                                                                                       | 19.20968         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                 |                  |        |         |        |          |         |          |
| 20.95GL                                                                                                                                                                                                                      | 79.29482         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                 |                  |        |         |        |          |         |          |

|         |         |        |       |      |          |       |          |         |        |      |
|---------|---------|--------|-------|------|----------|-------|----------|---------|--------|------|
| FUL FLW | TNK SEL | LIMITS | EMPTY | FULL | RAW DATA | SCALE | FUEL QTY | CAL TBL | DELETE | EDIT |
|---------|---------|--------|-------|------|----------|-------|----------|---------|--------|------|

**Figure 4-2 Fuel Calibration Page (Calibration Table)**

#### 4.6.1 Fuel Tank Calibration File Loading

Reference Section 3.4 to determine the appropriate software version for the current aircraft configuration. Once the determination has been made use the appropriate system software loader card to load the Fuel Calibration files.

1. If not already in configuration mode, restart the PFD in configuration mode by pulling, then resetting, the PFD circuit breaker while holding the ENT key.
2. On the PFD, at the System Upload page, activate the cursor and use the small FMS knob to highlight the CALIBRATION option in the GROUP field.
3. Press the ENT key.
4. Once the CALIBRATION file is selected the cursor moves to the ITEM window. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate fuel tank calibration (standard or extended range) and press ENT.

#### **IMPORTANT!**

It is at this step where the choice is given to load standard range or extended range fuel tank default calibration parameters. Be sure to select the correct option.

5. The CAL file is shown in the PRODUCT window. Verify it is 'checked' then press the LOAD softkey.

| SYSTEM UPLOAD                                                  |          |           |               |                                                      |
|----------------------------------------------------------------|----------|-----------|---------------|------------------------------------------------------|
| <b>AIRFRAME</b><br>Calibration                                 |          |           |               |                                                      |
| <b>FILE</b><br>DA40/DA40F Standard Range Fuel Tank Calibration |          |           |               |                                                      |
| <b>PRODUCT</b>                                                 |          |           |               |                                                      |
| CAL                                                            | LRU VERS | CARD VERS | CARD PART NUM | SOFTWARE<br>N/A                                      |
|                                                                |          |           |               | CONFIGURATION<br><input checked="" type="checkbox"/> |
| <b>SUMMARY</b>                                                 |          |           |               |                                                      |
| CHK ALL                                                        | CHK SW   | CHK CFG   | CLR ALL       | LOAD                                                 |
|                                                                |          |           |               | UPDT CFG                                             |

**Figure 4-3 System Upload Page**

6. Verify the file loads successfully and press the ENT key to acknowledge the confirmation prompt.
7. Press the UPDT CFG softkey, located in the lower right corner of the System Upload page.
8. A prompt will appear: "Update Config Module?"
9. Select YES and press the ENT key on the PFD.
10. The system will update the configuration module located in the PFD connector and prompt the technician when successfully complete. Press the ENT key to acknowledge the prompt.
11. Turn off the avionics and battery switches.
12. Remove the G1000 system software load card and reinsert the database cards in the lower slots of the displays.
13. Proceed to 4.6.2 to complete the fuel probe re-calibration.

---

## 4.6.2 Calibration Setup

These instructions are given in the event a fuel quantity probe is replaced or is in need of adjustment. These procedures apply to both standard and long-range fuel tanks.

### **IMPORTANT!**

During the completion of the Fuel Quantity Transducer Calibration ensure power is not removed during the calibration process for at least **1 minute** after a calibration is performed. It is possible if aircraft power is removed the calibration points will be lost.

### **NOTE**

Throughout the next section of this document screen shots and examples are used to illustrate the screens viewed during the calibration procedure. Although every effort has been made to ensure accuracy of such examples, changes may occur. Always refer to the data contained in the calibration procedure for actual values.

Only the LEFT tank is shown as examples.

### **NOTE**

The extended range fuel tank FULL calibration point is slightly different between the LEFT tank and the RIGHT tank. The LEFT tank will display 20.95 GL and the RIGHT tank will display 21.17 GL.

### **IMPORTANT!**

If the aircraft fuel calibration configuration files were reloaded in 4.6.1, both the Left hand and Right hand fuel tanks will require re-calibration. Re-calibration of both tanks is only necessary the first time the calibration files are reloaded to upgrade to the Calibration Table method of fuel calibration. Subsequent fuel probe replacements will only require the replacement probe to be recalibrated.

1. Level the aircraft, following instructions in the DA40 Airplane Maintenance Manual.
2. Drain all fuel from the tanks, and set the fuel selector switch to the 'OFF' position.

### **NOTE**

To achieve the required fuel quantity precision, it is recommended that the fuel quantities be weighed with a calibrated scale. Fuel density of 6.00 lbs/gallon is acceptable for purposes of this procedure.

3. Fill the fuel tank with 0.5 gallons ( $3 \pm 0.05$  pounds) fuel (unusable fuel).

### **CAUTION**

Use proper precautions when handling fuel. Ensure that the aircraft is grounded correctly and that there is adequate ventilation.

4. Start the G1000 in normal mode. With the tanks filled only with unuseable fuel, verify the presence of the amber L FUEL LOW and R FUEL LOW annunciations on the PFD.
5. Restart the PFD in configuration mode by pulling, then resetting, the PFD circuit breaker while holding the ENT key.
6. On the MFD, press the ENGINE softkey to display the full page engine instrumentation.

7. Go to the CAL Page Group on the PFD. The FUEL TANK CALIBRATION page should be displayed as shown:

**FUEL TANK CALIBRATION**

**FUEL FLOW**  
 ENG 1 SCALE 1.00000  
 ENG 2 SCALE 1.00000

**FUEL TEMP L**  
 OFFSET -----  
 RAW VAL ----- °F  
 CAL VAL 32.000 °F

**FUEL TEMP R**  
 OFFSET -----  
 RAW VAL ----- °F  
 CAL VAL 32.000 °F

**FUEL CALIBRATION POINTS**  
 CURRENT TANK **LEFT** FUEL UNITS **GALLONS(GL, GL/HR)**

**SENSOR LIMITS**

|                |          |
|----------------|----------|
| LEFT 1 FLOOR   | 0.00000  |
| LEFT 1 CEILING | 58.05999 |
| LEFT 2 FLOOR   | 0.00000  |
| LEFT 2 CEILING | 21.23483 |
| LEFT 3 FLOOR   | 0.00000  |
| LEFT 3 CEILING | 0.00000  |
| LEFT 4 FLOOR   | 0.00000  |
| LEFT 4 CEILING | 0.00000  |
| LEFT 5 FLOOR   | 0.00000  |
| LEFT 5 CEILING | 0.00000  |

**SENSOR INPUTS**

|        |          |
|--------|----------|
| LEFT 1 | 18.94685 |
| LEFT 2 | 0.14149  |
| LEFT 3 | -----    |
| LEFT 4 | -----    |
| LEFT 5 | -----    |

**ACTUAL FUEL QUANTITY** 5.00GL **CALIBRATION VALUE** 19.08834

**CALIBRATION TABLE**

| ACTUAL QUANTITY | CALIBRATED VALUE |
|-----------------|------------------|
| 0.00GL          | 0.00000          |
| 5.00GL          | 19.20968         |
| 20.95GL         | 79.29482         |

**CALIBRATED TOTAL** 5.00GL

**Bottom Status Bar:** FUL FLW | TNK SEL | LIMITS | EMPTY | FULL | RAW DATA | SCALE | FUEL QTY | CAL TBL | DELETE | RESET

**Figure 4-4 Fuel Calibration Page**

8. This page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence:
  - a) softkey 12 (Far Right softkey)
  - b) softkey 11
  - c) softkey 10
  - d) softkey 9
9. Press the TNK SEL softkey to activate the cursor in the CURRENT TANK field. Rotate the FMS knob as necessary throughout this procedure to select the RIGHT or LEFT tanks as desired.

### 4.6.3 Empty Calibration

1. On the PFD, select the desired fuel tank (LEFT or RIGHT). Note that for extended range tanks, there are two fuel probes each for the LEFT and RIGHT tanks. The fuel quantity from both probes is summed and displayed as a single tank quantity to the pilot. However, the raw data can be seen from both probes independently on the PFD at the FUEL TANK CALIBRATION page.
2. Verify that unusable fuel has been added to the selected tank. Allow the fuel probe(s) to stabilize for at least 2 minutes.
3. Press the EMPTY softkey. The cursor will automatically activate and select the CALIBRATE? option. The calibrated value setting will default to 0.00.
4. Press the ENT key. A prompt appears requesting overwrite acknowledgement. Select YES and press the ENT key. The G1000 system will 'zero' the actual fuel quantity value to be displayed.
5. Observe the CALIBRATED TOTAL indication for the selected tank. Verify that it remains at 0.00 GL.

| FUEL TANK CALIBRATION                                                                                                                                                                              |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>FUEL FLOW</b><br>ENG 1 SCALE 1.00000<br>ENG 2 SCALE 1.00000<br><b>FUEL TEMP L</b><br>OFFSET<br>RAW VAL °F<br>CAL VAL 32.000°F<br><b>FUEL TEMP R</b><br>OFFSET<br>RAW VAL °F<br>CAL VAL 32.000°F |         | <b>FUEL CALIBRATION POINTS</b><br>CURRENT TANK LEFT FUEL UNITS GALLONS(GL, GL/HR)<br><b>SENSOR LIMITS</b><br>LEFT 1 FLOOR 0.00000<br>LEFT 1 CEILING 58.05999<br>LEFT 2 FLOOR 0.00000<br>LEFT 2 CEILING 21.23483<br>LEFT 3 FLOOR 0.00000<br>LEFT 3 CEILING 0.00000<br>LEFT 4 FLOOR 0.00000<br>LEFT 4 CEILING 0.00000<br>LEFT 5 FLOOR 0.00000<br>LEFT 5 CEILING 0.00000<br><b>SENSOR INPUTS</b><br>LEFT 1 0.60218<br>LEFT 2 0.06141<br>LEFT 3<br>LEFT 4<br>LEFT 5<br>ACTUAL FUEL QUANTITY 5.00GL CALIBRATION VALUE 18.66360<br>CALIBRATE?<br><b>CALIBRATION TABLE</b><br>ACTUAL QUANTITY 0.00GL CALIBRATED VALUE 0.51198<br>20.95GL 79.29482<br>CALIBRATED TOTAL 0.00GL |                                                        |
| FUL FLW                                                                                                                                                                                            | TNK SEL | LIMITS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | EMPTY FULL RAW DATA SCALE FUEL QTY CAL TBL DELETE EDIT |

**Figure 4-5 Fuel Calibration Page (Empty Calibration)**

- On the MFD, verify the fuel quantity indicator correctly point to '0' for the affected tank.
- Before proceeding verify that the cursor is deactivated on the Fuel Tank Calibration page. If necessary depress the FMS knob to deactivate the cursor.
- Using the FMS knobs, go to the SYSTEM – SYSTEM UPLOAD page on the PFD, as shown:

| SYSTEM UPLOAD                                                                                                |          |
|--------------------------------------------------------------------------------------------------------------|----------|
| AIRFRAME<br>Calibration                                                                                      |          |
| FILE                                                                                                         |          |
| PRODUCT<br>LRU VERS CARD VERS CARD PART NUM SOFTWARE CONFIGURATION                                           |          |
| SUMMARY                                                                                                      |          |
| FUL FLW<br>TANK SEL<br>LIMITS<br>EMPTY<br>FULL<br>RAW DATA<br>SCALE<br>FUEL QTY<br>CAL TBL<br>DELETE<br>EDIT | UPDT CFG |

**Figure 4-6 System Upload Page**

- Press the UPDT CFG softkey, located in the lower right corner of the System Upload page.
- A prompt will appear: "Update Config Module?"
- Select YES and press the ENT key on the PFD.
- The system will update the configuration module located in the PFD connector and prompt the technician when successfully complete. Press the ENT key to acknowledge the prompt.
- Go to the CAL Page Group on the PFD and select the FUEL TANK CALIBRATION page.
- Repeat these steps for the opposite tank, if both sides require recalibration.

#### 4.6.4 5 Gallon Calibration

1. Fill the affected fuel tank with  $5 \pm 0.1$  gallons (30.0  $\pm$  0.05 pounds) usable fuel.
2. Allow the fuel probe(s) to stabilize at least 2 minutes before continuing.
3. With the desired tank selected, highlight the ACTUAL FUEL QUANTITY field and enter 5.00 Gallons.
4. Press the ENT key. The cursor automatically selects the CALIBRATE? option.
5. Press the ENT key again to calibrate the 5 gallon point.
6. Verify the 5.00 gallon point appears in the CALIBRATION TABLE.
7. Verify that the CALIBRATED TOTAL value indicates 5.00 GL.

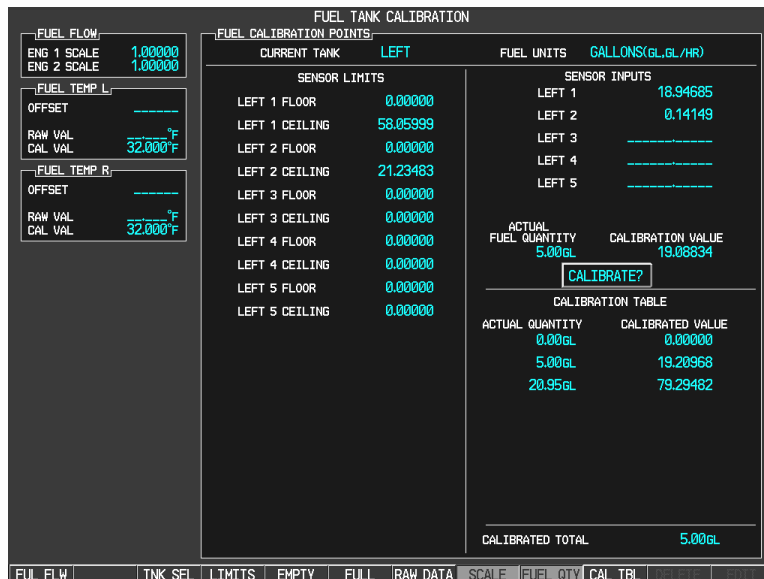


**Figure 4-7 Fuel Calibration Page (5 Gallon Calibration)**

8. On the MFD, verify the fuel quantity indicator correctly points to '5'.
9. Before proceeding verify that the cursor is deactivated on the Fuel Tank Calibration page. If necessary depress the FMS knob to deactivate the cursor.

10. Using the FMS knobs, go to the SYSTEM – SYSTEM UPLOAD page on the PFD, as shown:

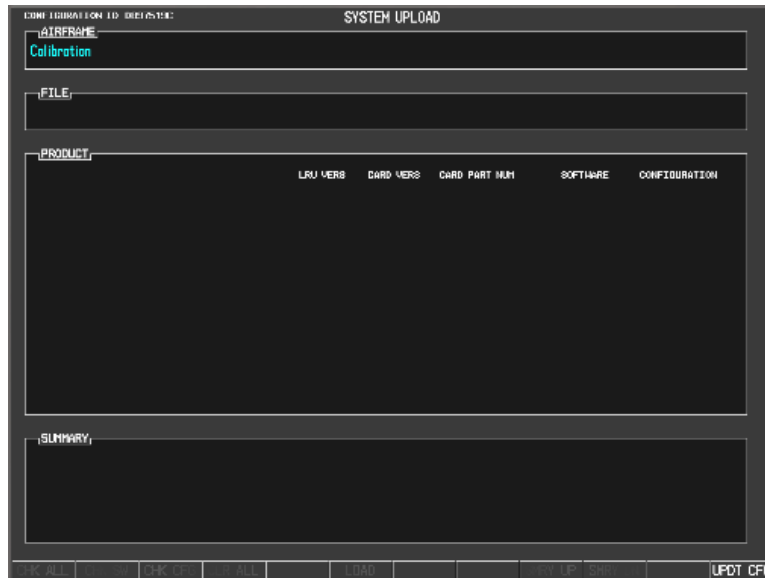


**Figure 4-8 System Upload Page**

11. Press the UPDT CFG softkey, located in the lower right corner of the System Upload page.
12. A prompt will appear: “Update Config Module?”
13. Select YES and press the ENT key on the PFD.
14. The system will update the configuration module located in the PFD connector and prompt the technician when successfully complete. Press the ENT key to acknowledge the prompt.
15. Go to the CAL Page Group on the PFD and select the FUEL TANK CALIBRATION page.
16. Repeat these steps for the opposite tank, if both sides require recalibration.
17. In the CALIBRATION TABLE, verify that each tank side has a 0.00 GL point, a 5.00 GL point, and a full point (16.66 GL for standard range tanks, 20.95 GL for the LEFT long range tank and 21.17 GL for the RIGHT long range tank).

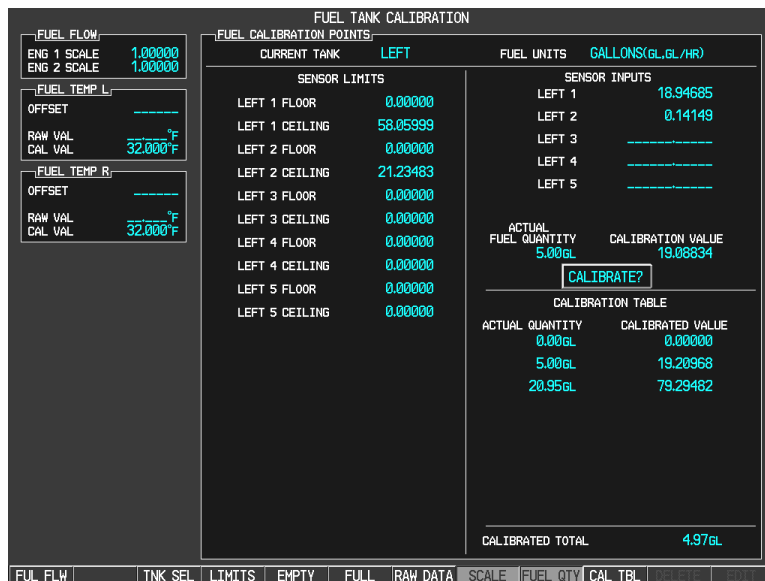


**Figure 4-9 Fuel Calibration Page (Calibration Complete)**

- 
18. Restart the PFD in normal mode. Verify that the L FUEL LOW and R FUEL LOW annunciations are not present.
  19. Fuel tank probe recalibration is complete.

#### **4.7 GRS 77 Earth Magnetic Field Updates**

The GRS 77 utilizes an Earth magnetic field model which is updated once every five years. The update is expected to be available from Garmin in each of the following years: 2010, 2015, and every five years thereafter, as long as the GRS 77 remains a Garmin-supported product.

The G1000 system alerts the operator that the magnetic field database is out of date by issuing the message “AHRS SERVICE – AHRS Magnetic-field model needs update” (Ref. Section 5.13). For the 2010 GRS MV update file, it may be loaded by one of two methods. The first method is by updating the Jeppesen Navigation database in the system to cycle 1013 or later for those aircraft with G1000 system software version 0369.13 as well as 0321.17 or later. Garmin Service Advisory 1051 gives instructions on how to update the GRS MV file using the Jeppesen Nav DB update method. Garmin Service Bulletin 0533 provides instructions for loading the file using a Garmin software loader card for aircraft with any system software version. The Service Alert and Service Bulletin may be obtained from [www.garmin.com](http://www.garmin.com) at the ‘Dealers Resource Center’ portion of the web site.

#### **4.8 GSA 81 Greasing Procedure**

Re-grease each servo output gear following this procedure.

1. Remove each servo (see Section 6.10).
2. Remove excess grease build-up from the single servo output gear using a lint-free cloth.

##### **IMPORTANT!**

It is not necessary to remove all of the grease from the output gear, only the excess grease. **DO NOT USE SOLVENTS TO CLEAN THE OUTPUT GEAR!**

3. Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 17 or Aeroshell 33MS grease.
4. Re-install the servos.
5. Move control surfaces through their range of motion.

## 4.9 Flap Position Discrete Input Check

### 4.9.1 (SW v0321.19 or earlier) Flap Position Discrete Input Check

To perform this check, all G1000 and GFC 700 equipment must be installed and operational. Start the G1000 system in Configuration Mode and go to the GIA Page Group and select the GIA I/O Configuration Page using the FMS knob. Perform the following checks:

The screenshot shows the 'GIA I/O CONFIGURATION' page. At the top, there are two dropdown menus: 'SELECT GIA UNIT' (set to GIA1) and 'SELECT INPUT/OUTPUT' (set to DISCRETE IN). Below these is a 'CONFIGURATION' table with columns for CHANNEL, DATA, DATA TYPE, INVERTED, and timing values (ACTV DEBNC (ms) and INACTV DEBNC (ms)). The table lists 26 channels (IN\* 1 to IN\* 6A) with their respective data types and settings. At the bottom, there is a status bar with 'SET>ACTV' and 'ACTV>SET' indicators.

| CHANNEL | DATA            | DATA TYPE       | INVERTED | ACTV DEBNC (ms) | INACTV DEBNC (ms) |
|---------|-----------------|-----------------|----------|-----------------|-------------------|
| IN* 1   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 2   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 3   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 4   | AFCS GO AROUND  | AFCS GO AROUND  | FALSE    | 0               | 0                 |
| IN* 5   | PLT CTRL WHL    | PLT CTRL WHL    | FALSE    | 0               | 0                 |
| IN* 6   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 7   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 8   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 9   | PLT PIT TRM ARM | PLT PIT TRM ARM | FALSE    | 0               | 0                 |
| IN* 10  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 11  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 12  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN 13   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN 14   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN 15   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN 16   | FLAP RETRACT    | FLAP RETRACT    | FALSE    | 0               | 0                 |
| IN 17   | FLAP EXTEND     | FLAP EXTEND     | FALSE    | 0               | 0                 |
| IN* 1A  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 2A  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 3A  | PLT PIT TRM UP  | PLT PIT TRM UP  | FALSE    | 0               | 0                 |
| IN* 4A  | PLT PIT TRM DWN | PLT PIT TRM DWN | FALSE    | 0               | 0                 |
| IN* 5A  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 6A  | OFF             | OFF             | FALSE    | 0               | 0                 |

Figure 4-10. (SW v0321.19 or earlier) GIA I/O Page

1. Extend the flaps down. While the flaps are traveling down, check that the discrete input labeled 'FLAP EXTEND' lights up green.
2. Retract the flaps up. While the flaps are traveling up, check that the discrete input labeled 'FLAP RETRACT' lights up green.
3. Restart the G1000 system in normal mode. Wait until the AHRS and ADC systems come online and for the AFCS Pre-flight Test to complete.
4. Press the FD key on the MFD to engage the Flight Director. Press the AP key to engage the Autopilot. Press the CWS button for a few seconds and release; verifying there is no residual force on the control stick for the pitch axis.
5. Extend the flaps to approach position. The trim wheel should immediately run in the DOWN direction. Now retract the flaps. The trim should immediately run in the UP direction.
6. Disengage the autopilot system.
7. The flap discrete input check is complete.

## 4.9.2 (SW v0321.22 or later) Flap Position Discrete Input Check

To perform this check, all G1000 and GFC 700 equipment must be installed and operational. Start the G1000 system in Configuration Mode and go to the GIA Page Group and select the GIA I/O Configuration Page using the FMS knob. Perform the following checks:

| GIA I/O CONFIGURATION |           |      |                     |                 |          |        |                 |        |                   |        |  |
|-----------------------|-----------|------|---------------------|-----------------|----------|--------|-----------------|--------|-------------------|--------|--|
| SELECT GIA UNIT       |           |      | SELECT INPUT/OUTPUT |                 |          |        |                 |        |                   |        |  |
| GIA1                  |           |      | DISCRETE IN         |                 |          |        |                 |        |                   |        |  |
| CONFIGURATION         |           |      |                     |                 |          |        |                 |        |                   |        |  |
| CHANNEL               | DATA TYPE |      |                     | ACTIVE          | INVERTED |        | ACTV DEBNC (ms) |        | INACTV DEBNC (ms) |        |  |
|                       | PIN       | DATA | SET                 |                 | SET      | ACTIVE | SET             | ACTIVE | SET               | ACTIVE |  |
| IN* 1                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 2                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 3                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 4                 |           |      | AFCS GO AROUND      | AFCS GO AROUND  | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 5                 |           |      | PLT CTRL WHL        | PLT CTRL WHL    | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 6                 |           |      | AFCS DISCONNECT     | AFCS DISCONNECT | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 7                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 8                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 9                 |           |      | PLT PIT TRM ARM     | PLT PIT TRM ARM | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 10                |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 11                |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 12                |           |      | GIA 1 FAN           | GIA 1 FAN       | TRUE     | TRUE   | 0               | 0      | 0                 | 0      |  |
| IN 13                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN 14                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN 15                 |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN 16                 |           |      | FLAP RETRACT        | FLAP RETRACT    | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN 17                 |           |      | FLAP EXTEND         | FLAP EXTEND     | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 1A                |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 2A                |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 3A                |           |      | PLT PIT TRM UP      | PLT PIT TRM UP  | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 4A                |           |      | PLT PIT TRM DWN     | PLT PIT TRM DWN | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 5A                |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| IN* 6A                |           |      | OFF                 | OFF             | FALSE    | FALSE  | 0               | 0      | 0                 | 0      |  |
| SET>ACTV/ACTV>SET     |           |      |                     |                 |          |        |                 |        |                   |        |  |

Figure 4-11. (SW v0321.22 or later) GIA I/O Page

1. Extend the flaps down. While the flaps are traveling down, check that the discrete input labeled 'FLAP EXTEND' annunciates a green "T" (True) in the DATA block and the PIN block annunciates an "H" on a white background.
2. Retract the flaps up. While the flaps are traveling up, check that the discrete input labeled 'FLAP RETRACT' annunciates a green "T" (True) in the DATA block and the PIN block annunciates an "H" on a white background.
3. Restart the G1000 system in normal mode. Wait until the AHRS and ADC systems come online and for the AFCS Pre-flight Test to complete.
4. Press the FD key on the MFD to engage the Flight Director. Press the AP key to engage the Autopilot. Press the CWS button for a few seconds and release; verifying there is no residual force on the control stick for the pitch axis.
5. Extend the flaps to approach position. The trim wheel should immediately run in the DOWN direction. Now retract the flaps. The trim should immediately run in the UP direction.
6. Disengage the autopilot system.
7. The flap discrete input check is complete.

## 4.10 Slip Clutch Torque Check Procedures

### 4.10.1 GSM 85 Slip Clutch Torque Check Procedure

The procedure in this section is for the GSM 85 servo gearboxes. To perform the procedure, all G1000 and GFC 700 equipment must be installed and operational.

The GSM85 slip clutch torque values must be checked, and adjusted if necessary, to the limits prescribed on each servo mount installation drawing. The procedure for adjusting the clutch is given on each servo mount installation drawing.

This adjustment requires the use of the Garmin slip clutch adjustment fixture, P/N 011-01085-01.

Refer to the following servo mount installation drawings for removal, clutch adjustment procedures, and re-installation:

005-00336-18: Roll Servo Installation Drawing

005-00336-17: Pitch Servo Installation Drawing

005-00336-19: Pitch Trim Servo Installation Drawing

### 4.10.2 GSM 86 Automated Slip Clutch Torque Check Procedure

The procedures in this section are for the GSM 86 servo gearboxes. To perform the procedure, all G1000 and GFC 700 equipment must be installed and operational.

Push the DISPLAY BACKUP button on the audio panel to set the MFD into reversionary mode.

With the PFD in Configuration Mode, rotate the large FMS knob and select the GFC Page Group. Rotate the small FMS knob to select the GFC STATUS Page. Perform the following checks:

The screenshot shows the GFC STATUS page with the following sections:

- SELECT GIA UNIT:** GIA 1
- SELECT SERVO AXIS:** ROLL SERVO
- GIA STATUS:** AP DISCONNECT (checked)
- MONITOR BOARD STATUS:**
  - SERVO PROGRAM 1: (X)
  - SERVO PROGRAM 2: (checked)
  - SERVO PROGRAM 3: (X)
  - AP DISCONNECT: (checked)
  - PFT: PASSED
  - HIGH RES LOAD CELL CAL: (checked)
  - HIGH RIG LOAD CELL CAL: (checked)
- CONTROL BOARD STATUS:**
  - SERVO PROGRAM 1: (X)
  - SERVO PROGRAM 2: (checked)
  - SERVO PROGRAM 3: (X)
  - AP DISCONNECT: (checked)
  - PFT: PASSED
- DRIVE SERVO:** RPM 0.00rpm
- SERVO DATA:**
  - VOLTAGE: 0.00V
  - CURRENT: 0.00A
  - SPEED: 0.00rpm
  - TORQUE: 0.00in-lb
  - CLUTCH ENGAGE STATUS: (X)
- SLIP CLUTCH TEST RESULTS:**
  - LEFT: MIN \_\_\_\_in-lb, MAX \_\_\_\_in-lb
  - RIGHT: MIN \_\_\_\_in-lb, MAX \_\_\_\_in-lb

At the bottom, there are buttons: TEST YAS, TEST SV, TEST ALL, ENG CLCH DRV SRVO, and RST GAIN.

**Figure 4-12, GFC Status Page**

#### **IMPORTANT!**

**It is highly recommended that the following test be performed at temperatures between 50° F and 120° F.**

---

#### 4.10.2.1 Pitch Servo Slip Clutch Torque Check

1. Press the small FMS knob to activate the cursor. Rotate the large FMS knob to highlight the SELECT SERVO AXIS field. Rotate the small FMS knob to display the drop down menu then rotate the small FMS knob to select the PITCH SERVO and press ENT.
2. Verify that the PFT status fields show PASSED.

#### **IMPORTANT!**

**If the test must be stopped, firmly grasp the aircraft control being moved and press the red AP DISC switch on the aircraft control stick. If an abnormal disconnect of a servo occurs, reset AFCS circuit breaker and repeat the step.**

3. Verify that the aircraft control surface to be checked is free to travel throughout its range of motion.
4. Position the control surface in the neutral position.
5. Press the TEST SVO softkey. Use the large FMS knob to highlight YES and press the ENT key.
6. Verify the MFD shows a white CAS message CLUTCH PIT PROG, which indicates that the test of the stated axis is in progress.
7. Verify the PITCH SERVO drives the control surface to the NOSE UP stop.
8. After approximately a 25 second data collection period has expired, verify the servo automatically drives in the opposite direction and begins data collections for the NOSE DOWN stop.
9. Allow the PITCH SERVO to drive the control surface to the NOSE DOWN stop.
10. After approximately a 25 second data collection period has expired, verify the MFD shows the CLUTCH PIT PASS message.
11. Press the ENT key to acknowledge the COMPLETE prompt on the PFD.
12. If the MFD shows the CLUTCH PIT FAIL message repeat the test twice in the failed axis. If the test does not pass, the GSM 86 slip clutch cartridge must be replaced or tested using the Manual Slip Clutch Test Procedure, Section 4.10.3.

#### **IMPORTANT!**

**The Min and Max Torque values displayed on the MFD should not be used to determine whether the test passed or failed. Only the presence of the CAS message CLUTCH PIT PASS on the MFD can make sure that the test passed in a given axis.**

#### **NOTE**

**The CAS messages for CLUTCH PIT PASS or CLUTCH PIT FAIL will remain in the CAS window until aircraft power is removed. On the next aircraft power up the messages will be removed.**

13. Firmly grasp the control stick and press the red AP DISC button on the control stick to relieve any control tension.

---

#### 4.10.2.2 Pitch Trim Servo Slip Clutch Torque Check

1. Press the small FMS knob to activate the cursor. Rotate the large FMS knob to highlight the SELECT SERVO AXIS field. Rotate the small FMS knob to display the drop down menu then rotate the small FMS knob to select the PITCH TRIM SERVO and press ENT.
2. Verify that the PFT status fields show PASSED.

##### **IMPORTANT!**

**If the test must be stopped, firmly grasp the aircraft control being moved and press the red AP DISC switch on the aircraft control stick. If an abnormal disconnect of a servo occurs, reset AFCS circuit breaker and repeat the step.**

3. Verify that the aircraft control surface to be checked is free to travel throughout its range of motion.
4. Position the Pitch Trim Wheel in the TAKE OFF (TO) position.
5. Press the TEST SVO softkey. Use the large FMS knob to highlight YES and press the ENT key.
6. Verify the MFD shows a white CAS message CLUTCH PTRM PRO, which indicates that the test of the stated axis is in progress.
7. Verify the PITCH TRIM SERVO drives the control surface to the NOSE UP stop.
8. After approximately a 25 second data collection period has expired, verify the servo automatically drives in the opposite direction and begins data collections for the NOSE DOWN stop.
9. Allow the PITCH TRIM SERVO to drive the control surface to the NOSE DOWN stop.
10. After approximately a 25 second data collection period has expired, verify the MFD shows the CLUTCH PTRM PAS message.
11. Press the ENT key to acknowledge the COMPLETE prompt on the PFD.
12. If the MFD shows the CLUTCH PTRM FAIL message repeat the test twice in the failed axis. If the test does not pass, the GSM 86 slip clutch cartridge must be replaced or tested using the Manual Slip Clutch Test Procedure, Section 4.10.3.

##### **IMPORTANT!**

**The Min and Max Torque values displayed on the MFD should not be used to determine whether the test passed or failed. Only the presence of the CAS message CLUTCH PTRM PASS on the MFD can make sure that the test passed in a given axis.**

##### **NOTE**

**The CAS messages for CLUTCH PTRM PAS or CLUTCH PTRM FAIL will remain in the CAS window until aircraft power is removed. On the next aircraft power up the messages will be removed.**

13. Firmly grasp the control stick and press the red AP DISC button on the control stick to relieve any control tension.

---

#### 4.10.2.3 Roll Servo Slip Clutch Torque Check

1. Press the small FMS knob to activate the cursor. Rotate the large FMS knob to highlight the SELECT SERVO AXIS field. Rotate the small FMS knob to display the drop down menu then rotate the small FMS knob to select the ROLL SERVO and press ENT.
2. Verify that the PFT status fields show PASSED.

##### **IMPORTANT!**

**If the test must be stopped, firmly grasp the aircraft control being moved and press the red AP DISC switch on the aircraft control stick. If an abnormal disconnect of a servo occurs, reset AFCS circuit breaker and repeat the step.**

3. Verify that the aircraft control surface to be checked is free to travel throughout its range of motion.
4. Position the control surface in the neutral position.
5. Press the TEST SVO softkey. Use the large FMS knob to highlight YES and press the ENT key.
6. Verify the MFD shows a white CAS message CLUTCH ROL PROG, which indicates that the test of the stated axis is in progress.
7. Verify the ROLL SERVO drives the control surface to the LEFT stop.
8. After approximately a 25 second data collection period has expired, verify the servo automatically drives in the opposite direction and begins data collections for the RIGHT stop.
9. Allow the ROLL SERVO to drive the control surface to the RIGHT stop.
10. After approximately a 25 second data collection period has expired, verify the MFD shows the CLUTCH ROL PASS message.
11. Press the ENT key to acknowledge the COMPLETE prompt on the PFD.
12. If the MFD shows the CLUTCH ROL FAIL message repeat the test twice in the failed axis. If the test does not pass, the GSM 86 slip clutch cartridge must be replaced or tested using the Manual Slip Clutch Test Procedure, Section 4.10.3.

##### **IMPORTANT!**

**The Min and Max Torque values displayed on the MFD should not be used to determine whether the test passed or failed. Only the presence of the CAS message CLUTCH ROL PASS on the MFD can make sure that the test passed in a given axis.**

##### **NOTE**

**The CAS messages for CLUTCH ROL PASS or CLUTCH ROL FAIL will remain in the CAS window until aircraft power is removed. On the next aircraft power up the messages will be removed.**

13. Firmly grasp the control stick and press the red AP DISC button on the control stick to relieve any control tension.

### 4.10.3 GSM 86 Manual Slip Clutch Test Procedure

This test is an alternative to the GSM 86 automated slip clutch test procedure.

#### **IMPORTANT!**

**This adjustment requires the use of the Garmin servo adjustment fixture, P/N 011-01085-01. For detailed operating instructions for the fixture, refer to GSA8X / GSM85(A) Installation Manual, listed in Table 1-4.**

**It is highly recommended that the following test be performed at temperatures between 50° F and 120° F.**

1. Remove the GSM 86 servo gearbox as per Section 6.11.
2. Place the GSM 86 servo gearbox on the slip-clutch adjustment fixture and secure with the toggle clamps. Install the fixture chain between the capstan under test and the fixture capstan. Remove the slack in the chain using the tension adjustment knob. Tighten the two wingnuts on bottom of fixture while holding the top thumbscrews.
3. Attach a socket to a calibrated torque wrench of appropriate range and place on top of the fixture capstan. Adjust the wrench support fixture so that it contacts the handle in the appropriate location.
4. Connect a 2 Amp, 24 V, DC power supply to the fixture.
5. Place the solenoid switch to "on" and move the direction switch to the clockwise or counter-clockwise position. Allow the clutch to rotate at least one revolution in each direction (note: the capstan itself is fixed).
6. Observe the torque reading for at least two full revolutions in each direction. Record the minimum and maximum torque values. When finished, remove the fixture cable, and then remove the servo gearbox from the fixture.
7. If the minimum and maximum torque values are within the specified range in Table 4-3, the slip clutch cartridge is acceptable. Reinstall the GSM 86 servo gearbox per Section 6.11.
8. If the minimum and maximum torque values are not within the specified range in Table 4-3, the slip clutch cartridge must be replaced. Refer to section 6.11 for removal and replacement of the servo mount. Refer to the servo install drawings listed in Table 1-2 for replacement of clutch cartridge.
9. Re-accomplish section 4.10.2 testing for the affected servo axis.

| Axis       | Direction | Min Measured Torque (in-lbs) | Max Measured Torque (in-lbs) | Min Allowed Torque (in-lbs) | Max Allowed Torque (in-lbs) |
|------------|-----------|------------------------------|------------------------------|-----------------------------|-----------------------------|
| Pitch      | CW        |                              |                              | 27                          | 45                          |
|            | CCW       |                              |                              |                             |                             |
| Roll       | CW        |                              |                              | 29                          | 48                          |
|            | CCW       |                              |                              |                             |                             |
| Pitch Trim | CW        |                              |                              | 27                          | 45                          |
|            | CCW       |                              |                              |                             |                             |

**Table 4-3. GSM 86 Measured Torque**

---

#### 4.10.4 GSM 86 Manual Overpower Check

These procedures are applicable to GFC 700 installations with GSM 86 servo gearboxes.

##### **NOTE**

The GFC 700 uses electronic torque limiting as well as mechanical slip clutches to limit the maximum servo effort. When the system is on the ground, the electronic torque limiting is removed, allowing manual checks of the slip-clutch settings.

1. Engage the Autopilot by pressing the AP key on the MFD.
2. Apply force to the control stick to determine if the Autopilot clutches can be overpowered in pitch and roll. If the Autopilot clutches cannot be overpowered, check the servo clutch torque settings (Reference Section 4.10.2).
3. Actuate the MEPT switch in the nose down position. This causes an Autopilot disconnect and the trim will run in the nose-down direction.
4. While the trim is running, grasp the aircraft pitch trim wheel and verify that the trim clutch can be overpowered in both directions.
5. Actuate the MEPT switch in the nose up position and verify the trim clutch can be overpowered in both directions. If the trim clutch cannot be overpowered, check the trim servo clutch torque setting (Reference Section 4.10.2).
6. Verify also that the trim wheel moves smoothly in both directions throughout the entire trim range during MEPT switch operation.

##### **NOTE**

If the trim wheel hesitates, this may indicate that the pitch trim clutch is slipping. First verify proper clutch setting and cable tension. If both clutch setting and cable tension are within tolerance, check the aircraft pitch trim system for excessive friction.

## 4.11 PFD/MFD Power Interrupt Function Checks

### 4.11.1 PFD/MFD Power Interrupt Function Check (All except SW v0321.22)

The MFD and PFD power interrupt backup capacitors must be checked every aircraft annual.

1. Remove the MFD and PFD displays following the instructions shown in Section 6.1.
2. Review the TSO label on each display. Check the MOD Status block against Table 4-4:

| Unit     | Unit Part Number | Long Term Power Interrupt Category A (200 mS)* Mod Status |
|----------|------------------|-----------------------------------------------------------|
| GDU 1040 | 011-00972-00     | 2                                                         |
|          | 011-00972-03     | 1                                                         |
| GDU 1042 | 011-01080-00     | 1                                                         |
| GDU 1044 | 011-01078-01     | 1                                                         |

\*Per RTCA DO-160D Section 16

**Table 4-4. Power Interrupt Category A (200mS) Mod Status**

- a) If display meets or exceeds the minimum MOD status required as specified in Table 4-4, then no further action is required. Reinstall the display according to Section 6.1.
  - b) If one or both displays do not meet the specified MOD status, then the following procedure must be performed.
3. Verify the ambient air temperature is at least 70° Fahrenheit. Apply power to both displays and leave them on for a minimum of 11 minutes.
  4. Remove power from both displays. Place both displays in Configuration mode by holding the ENT key while applying power.
  5. Using the FMS knob go to the GDU TEST page (Figure 4-13) on the MFD and PFD (part of the GDU Page Group).
  6. Verify the BKUP CAPS light is green. If the BKUP CAPS light is red, replace the GDU.

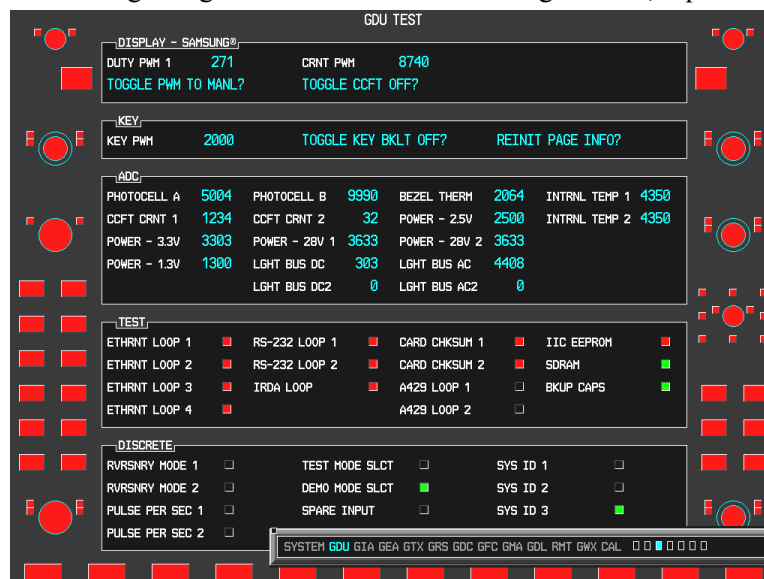


**Figure 4-13. GDU TEST Page**

#### 4.11.2 PFD/MFD Power Interrupt Function Check (SW v0321.22 **ONLY**)

The MFD and PFD power interrupt backup capacitors must be checked every aircraft annual.

1. Remove the MFD and PFD displays following the instructions shown in Section 6.1.
2. Review the TSO label on each display. Check the MOD Status block against Table 4-5:

**Table 4-5. Power Interrupt Category A (200mS) Mod Status**

| Unit     | Unit Part Number | Long Term Power Interrupt Category B (200 mS)* Mod Status |
|----------|------------------|-----------------------------------------------------------|
| GDU 1040 | 011-00972-00     | 2                                                         |
|          | 011-00972-03     | 1                                                         |
| GDU 1042 | 011-01080-00     | 1                                                         |
| GDU 1044 | 011-01078-01     | 1                                                         |

\*Per RTCA DO-160D Section 16.

- a) If display meets or exceeds the minimum MOD status required as specified in Table 4-5, then no further action is required. Reinstall the display according to Section 6.1.
- b) If one or both displays do not meet the specified MOD status, then the following procedure must be performed.

#### Category B Long Term Power Interrupt Annual Inspection Procedure

1. Before beginning the Category B Long Term Power Interrupt Annual Inspection Procedure, the test software “GDU Backup Cap Test Software (006-B0380-15)” must be downloaded from the Garmin website:

Access the Dealer Resource Center portion of the Garmin website ([www.garmin.com](http://www.garmin.com)).

From the Technical Resource list, click on the “GDU Backup Cap Test Software (006-B0380-15)” link.

Extract the files onto a blank SD card.

2. Remove the Supplemental Data Card from the lower slot of the GDU before loading any software.

#### **NOTE**

Supplemental Data Cards left inserted can become corrupt, making them unusable. Replacing corrupt cards is not covered under warranty.

3. Insert the SD card containing the test software into the top slot of the MFD.

#### **NOTE**

Loading “GDU Backup Cap Test Software (006-B0380-15)” to the GDU temporarily changes the GDU software version to v7.10. It is required to return the system to the currently approved system software version and configuration following the Long Term Power Interrupt Test.

4. Power the MFD on in configuration mode by holding down the ENT key while applying power (release the ENT key when the words “INITIALIZING SYSTEM” appear on the display).

**NOTE**

Loading “GDU Backup Cap Test Software (006-B0380-15)” to the GDU may present the following nuisance messages on the MFD and PFD screens while loading. Acknowledge the message by pressing the ENT key or let it time out to move to the next step.

- a) “Splash Screen File not Found”.
  - b) “Unknown Configuration for Config Module” – xxxxxxxxxxxx (denotes place holder for the specific configuration listed).
5. Press the ENT key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
  6. Press the ENT key to confirm software update completion.
  7. Remove the SD card from the MFD and insert into the top slot of the PFD (leave the MFD on in configuration mode).
  8. Power the PFD on in configuration mode by holding down the ENT key while applying power (release the ENT key when the words “INITIALIZING SYSTEM” appear on the display).
  9. Press the ENT key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
  10. Press the ENT key to confirm software update completion.
  11. Use the FMS knob to select the SYSTEM UPLOAD Page.
  12. Select the configuration file “Backup Capacitor Test 50ms” from the SYSTEM UPLOAD Page (Figure 4-14).



**Figure 4-14. Backup Capacitor Test Selection**

13. Press the ENT key to confirm the configuration file selection.
14. Press the LOAD softkey to load the configuration file.
15. Press the ENT key to confirm upload completion (Figure 4-15).



**Figure 4-15. Upload Complete Window**

16. Remove the SD card from the PFD.
17. Remove power from the MFD and PFD.
18. Verify the ambient air temperature is at least 70° Fahrenheit. Apply power to both displays and leave them on for a minimum of 11 minutes.

**NOTE**

Loading “GDU Backup Cap Test Software (006-B0380-15)” to the GDU may present the following nuisance messages on the MFD and PFD screens when in the normal mode.

- a) “Splash Screen File not Found”.
  - b) “Unknown Configuration for Config Module” – xxxxxxxxxxxx (denotes place holder for the specific configuration listed).
  - c) Alert “Manifest – PFD 1 software mismatch, communication halted”.
  - d) Alert “Manifest – MFD 1 software mismatch, communication halted”.
19. Remove power from the MFD and PFD. Place both displays in Configuration mode by holding the ENT key while applying power.

**NOTE**

Loading “GDU Backup Cap Test Software (006-B0380-15)” to the GDU may present the following nuisance messages on the MFD and PFD screens while loading. Acknowledge the message by pressing the ENT key or let it time out to move to the next steps.

- a) “Splash Screen File not Found”.
- b) “Unknown Configuration for Config Module” – xxxxxxxxxxxx (denotes place holder for the specific configuration listed).

20. Using the FMS knob go to the GDU TEST page (Figure 4-16) on the MFD and PFD (part of the GDU Page Group).
21. Verify the BKUP CAPS box is green indicating a passed test. If the BKUP CAPS box is red, replace the GDU.

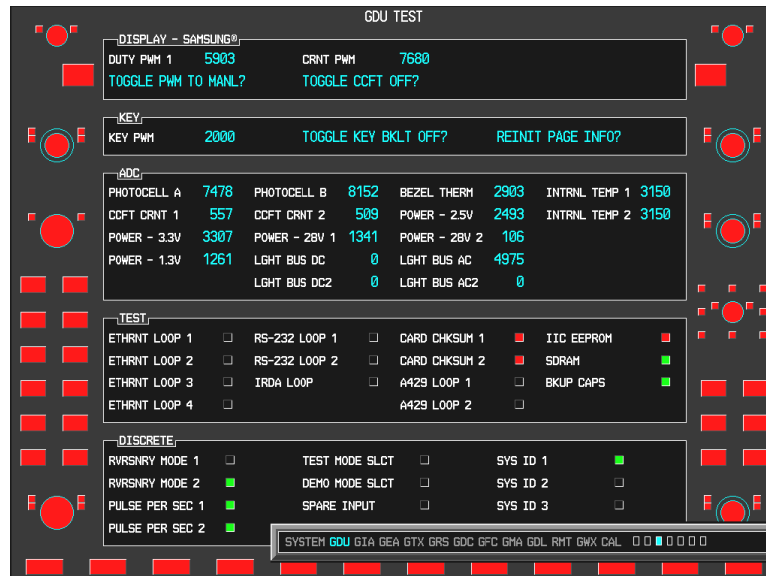


**Figure 4-16. BKUP CAPS Checkbox on GDU TEST Page**

22. Reload the MFD and PFD to the currently approved system software version and reconfigure as directed in Section 3.6.
23. Be sure that the user settings for the replaced display are cleared. Clear user settings by pressing the CLR key on the GDU displays while applying power to it. Acknowledge the on-screen prompt by pressing the ENT key or the right-most softkey.

#### **NOTE**

Loading test software 006-B0380-15 to the GDUs changes the GDU software version to v7.10. It is required to return the GDU to the currently approved system software version and configuration.

## 4.12 Lightning Protection Fuse Replacement

Every 24 calendar months, replace all lightning protection 3.2 Amp slow-blow fuses. There are five total fuses in the system that is part of this requirement (Reference Section 4.1).

Figure 4-17 shows the general location of the fuse locations and provides reference to the applicable detail with in this section that applies.

Table 4-6 lists the appropriate P/N of the 3.2 Amp slow blow fuse that is required for the fuse replacement.

**Table 4-6. Lightning Protection Fuse Part Numbers**

| PARTS LIST      |              |            |     |
|-----------------|--------------|------------|-----|
| PART NUMBER     | DESCRIPTION  | VENDOR     | QTY |
| 350-A3201-01 OR | FUSE 3.2 AMP | GARMIN OR  | 5   |
| 0313-03.2P      |              | LITTLEFUSE |     |

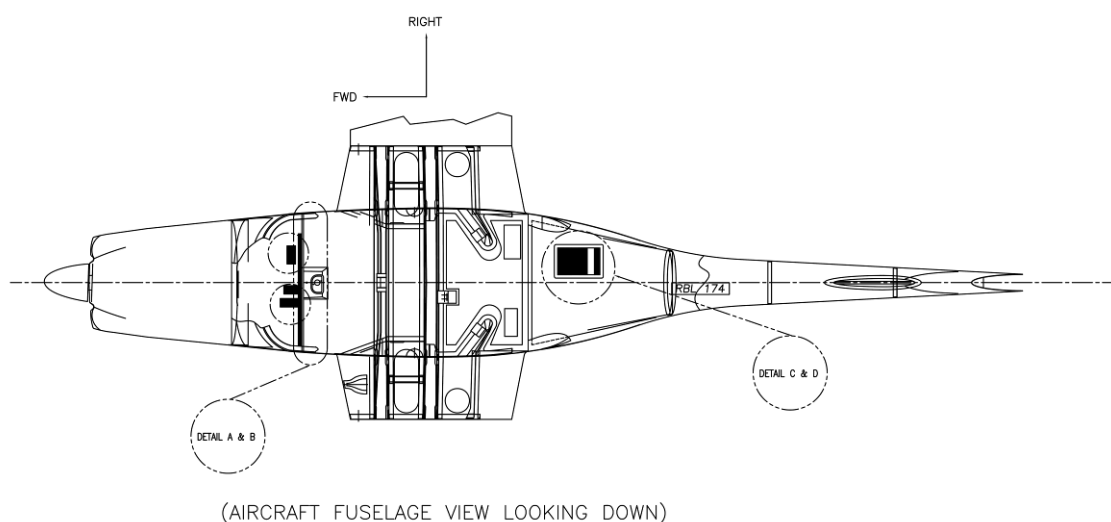


**Figure 4-17. Aircraft Fuselage Fuse Locations**

### 4.12.1 Battery and Alternator Voltage Suppressor Fuse Replacement

To gain access for the fuse replacement, remove the instrument panel cover as described in the DA 40 Aircraft Maintenance Manual.

1. Refer to Figure 4-17, Figure 4-18 and Figure 4-19 to locate the two fuses mounted behind the instrument panel, near the circuit breaker panel. Each fuse is wired inline with a voltage suppressor.
2. Twist each fuse holder cap counter-clockwise, remove each fuse and replace with a new fuse. Reference Table 4-6 for the proper P/N fuse.
3. Reinstall the instrument panel cover as described in the DA 40 Aircraft Maintenance Manual.

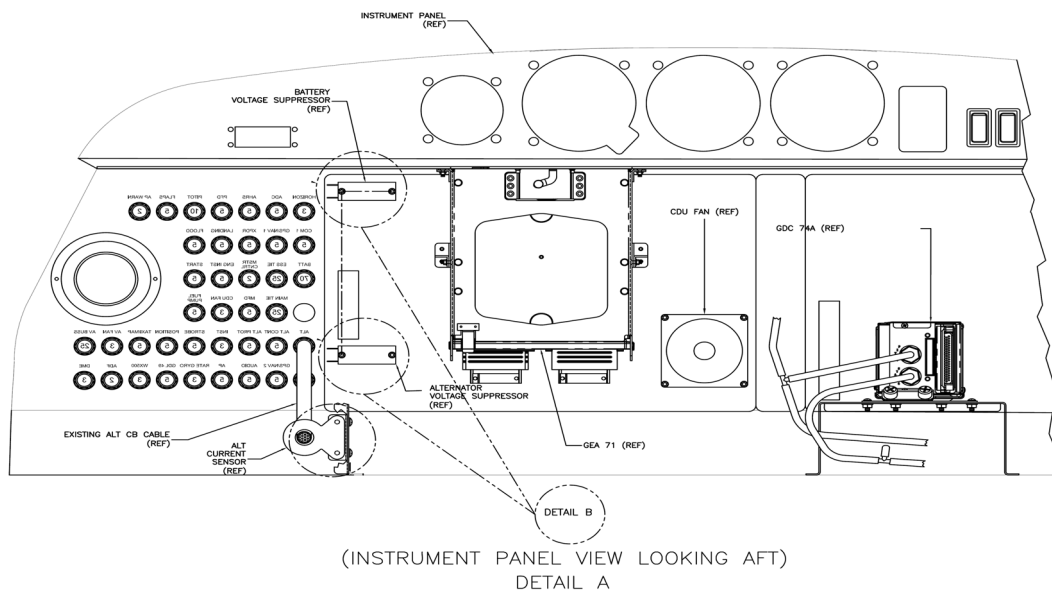


**Figure 4-18. Instrument Panel Detail A**

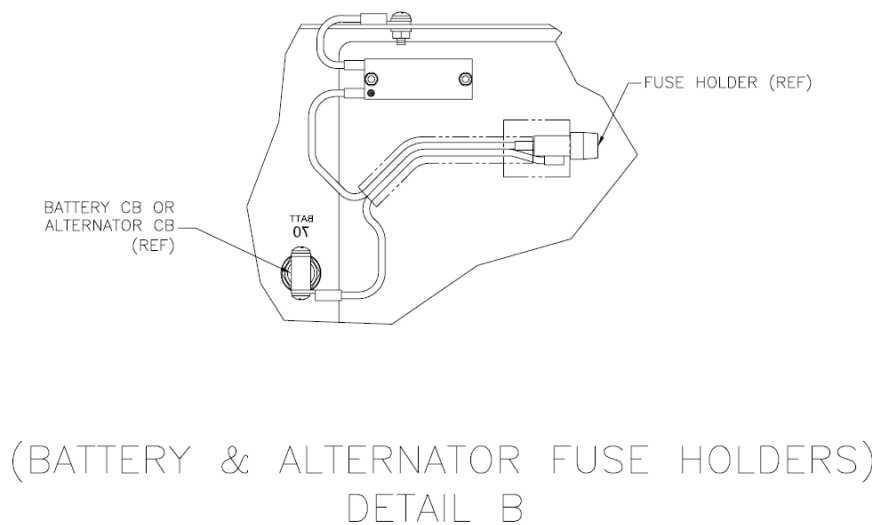


**Figure 4-19. Instrument Panel Detail B**

#### 4.12.2 GIA63 #1, GIA63 #2 & GRS77 Voltage Suppressor Fuse Replacement

To replace the fuses, perform the following steps. Refer to the DA40 Aircraft Maintenance Manual for instructions to remove and replace interior items to access the fuses.

1. Remove rear baggage compartment floor.
2. Detach seat belts.
3. Remove baggage compartment shell.
4. Remove Rear Passenger Seats.
5. Refer to Figure 4-17, Figure 4-20 and Figure 4-21 to locate the three fuses which is attached to the forward portion of the remote avionics enclosure. Each fuse is mounted to the side of the block, and each is labeled.
6. Twist each fuse holder cap counter-clockwise, remove each fuse and replace with a new fuse. Reference Table 4-6 for the proper P/N fuse.
7. Reinstall the interior components that were removed for access.

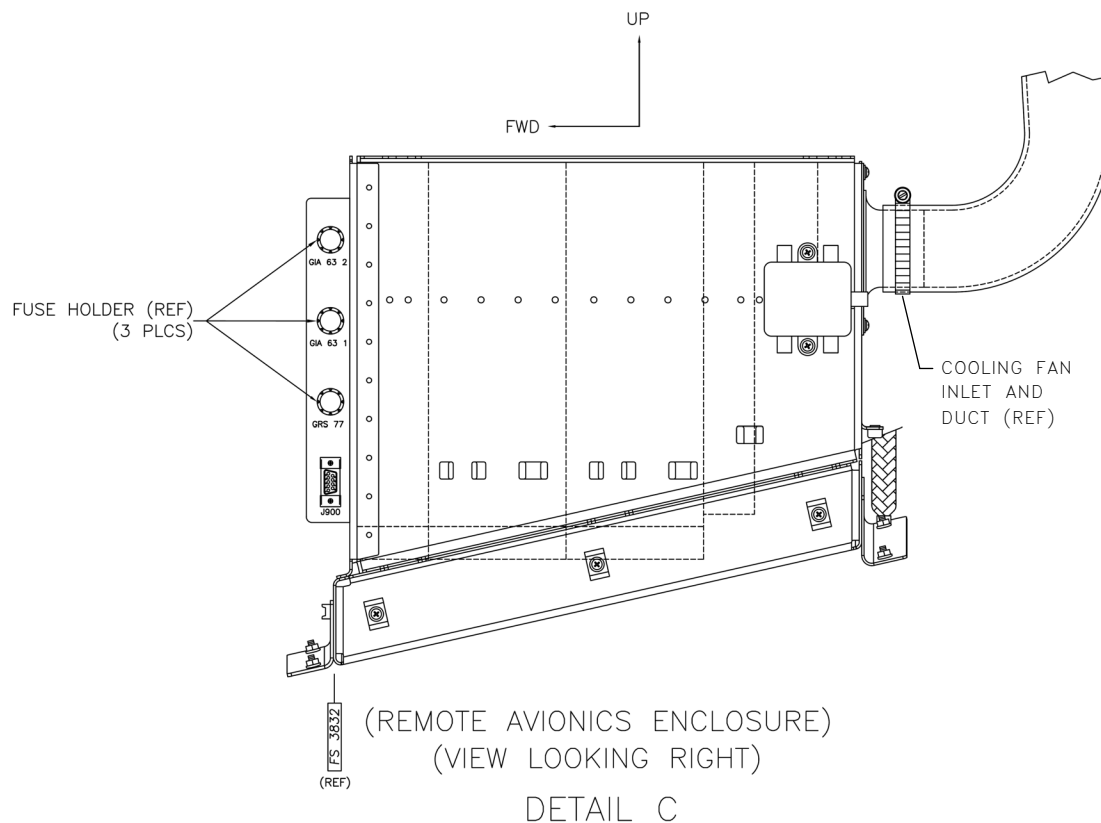


**Figure 4-20. Remote Avionics Enclosure Detail C**

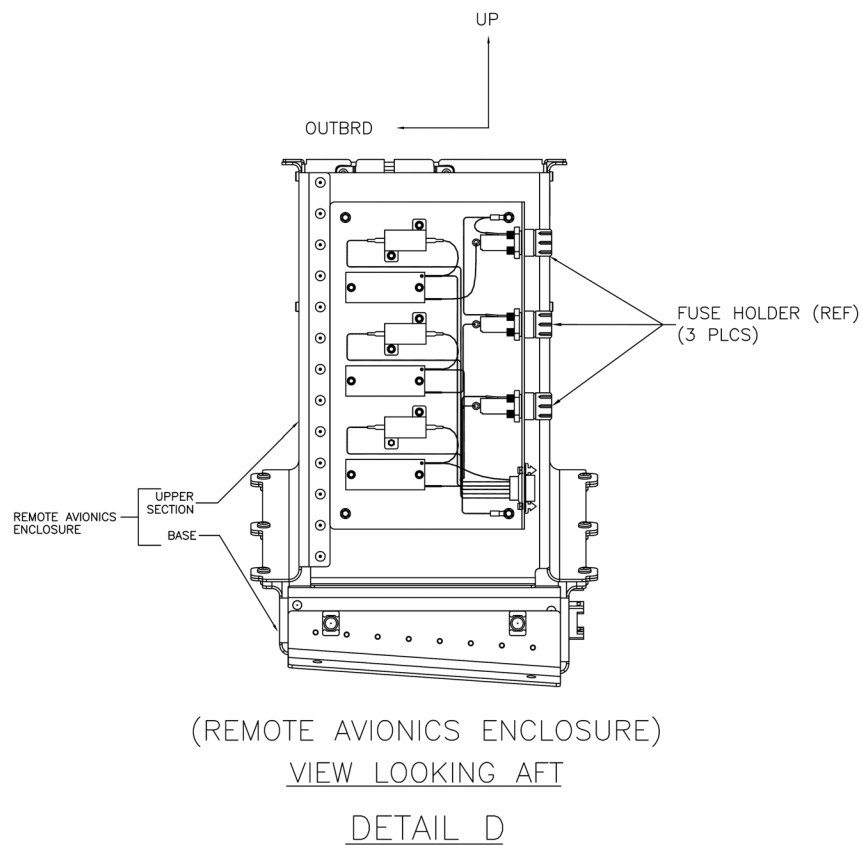


**Figure 4-21. Remote Avionics Enclosure Detail D**

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## 4.13 Cooling Fan Function & Fan Fail Annunciation Test

These tests prescribed in this section verify proper operation of the display and avionics cooling fans and the fan failure annunciation logic. For aircraft equipped with software version 0321.23 or later only, perform these tests every 250 flight hours or every aircraft annual, whichever comes first.

### 4.13.1 Display Cooling Fan Function Test

1. With the G1000 avionics system powered normally, temporarily remove the PFD from the instrument panel by rotating each of the four ¼ turn fasteners counter-clockwise. Remove the PFD from the instrument panel and hold by hand (do not disconnect harness).
2. Visually observe and verify the PFD cooling fan located in the lower left corner of the panel opening is operating correctly. The fan is operating correctly when observed to be spinning and generating airflow and is not otherwise obstructed by foreign debris such as dust or dirt.
3. Put the PFD back into position in the instrument panel and secure the ¼ turn fasteners.
4. Temporarily remove the MFD from the instrument panel by rotating each of the four ¼ turn fasteners counter-clockwise. Remove the MFD from the instrument panel and hold by hand (do not disconnect harness).
5. Visually observe and verify the MFD cooling fan located in the lower left corner of the panel opening is operating correctly. The fan is operating correctly when observed to be spinning and generating airflow and is not otherwise obstructed by foreign debris such as dust or dirt.
6. Place the MFD back into position in the instrument panel and secure the ¼ turn fasteners.

### 4.13.2 PFD & MFD Fan Fail Annunciation Test

1. With the G1000 avionics system powered normally, open the CDU FAN circuit breaker.
2. Verify amber PFD FAN FAIL and MFD FAN FAIL caution annunciations are posted to the PFD CAS window.
3. Press the CAUTION softkey.
4. Verify the PFD FAN FAIL and MFD FAN FAIL annunciations are acknowledged and are moved down the CAS alert list.
5. Close the CDU FAN circuit breaker.
6. Verify that the amber 'PFD FAN FAIL' and 'MFD FAN FAIL' CAS annunciations are extinguished.

### 4.13.3 Avionics Bay Cooling Fan Function Test

1. Remove the baggage compartment cover to gain access to the remote avionics enclosure.
2. Detach seat belts.
3. Remove baggage compartment shell.
4. Loosen the hose clamp then remove the cooling duct from the remote avionics enclosure inlet (refer to Figure 4-20).
5. With the G1000 avionics system powered normally, listen for fan noise and check for positive air flow (suction) from the inlet going into the remote avionics enclosure.

- 
6. Reconnect cooling duct to the remote avionics enclosure inlet, securing the duct with the existing hose clamp.
  7. Re-install baggage compartment and reattach the seat belts.

#### **4.13.4 GIA Fan Fail Annunciation Test**

1. With the G1000 avionics system powered normally, open the AV FAN circuit breaker.
2. Verify an amber GIA FAN FAIL caution annunciation is posted to the PFD CAS window.
3. Press the CAUTION softkey.
4. Verify the PFD FAN FAIL and MFD FAN FAIL annunciations are acknowledged and are moved down the CAS alert list.
5. Close the AV FAN circuit breaker.
6. Verify that the GIA FAN FAIL caution annunciation is removed from the PFD CAS window.

## 5 TROUBLESHOOTING

This section provides instructions and guidance for G1000 system troubleshooting, as installed in the Diamond Model DA 40.

### **IMPORTANT!**

Sections 6, 7 and 8 provide detailed instructions on equipment removal, replacement, configuration, and return-to-service testing. Anytime a G1000 component or LRU is removed, swapped, or replaced, the technician must follow the procedures given in Sections 6, 7 and 8 to ensure proper operation of the system.

Troubleshoot the G1000 system by first identifying, then isolating the specific failure to the responsible LRU. There are several indications that the G1000 presents to the pilot or technician, showing overall system condition. A course of action should be determined based on the information presented on the display. This section shows possible scenarios likely to be encountered during normal operation and gives troubleshooting guidance to the technician to resolve problems.



**Figure 5-1. AUX – System Status Page**

The AUX – System Status page is the 5<sup>th</sup> page in the AUX Page Group and displays the following information for each LRU and sub-function:

- Status: A green check is displayed for properly operating LRUs. A red 'x' appears when a LRU fault is detected, or if the LRU is unavailable.
- Serial Number: Each LRU serial number is displayed (functions such as GPS and GS are contained within an LRU; therefore, serial numbers are not shown for these).
- Current SW Version Loaded.

When troubleshooting, first check to ensure that each LRU status is 'green' and that the correct software is loaded in each unit. Additional airframe and database information is also displayed on this page.

## 5.1 G1000 Alerting System

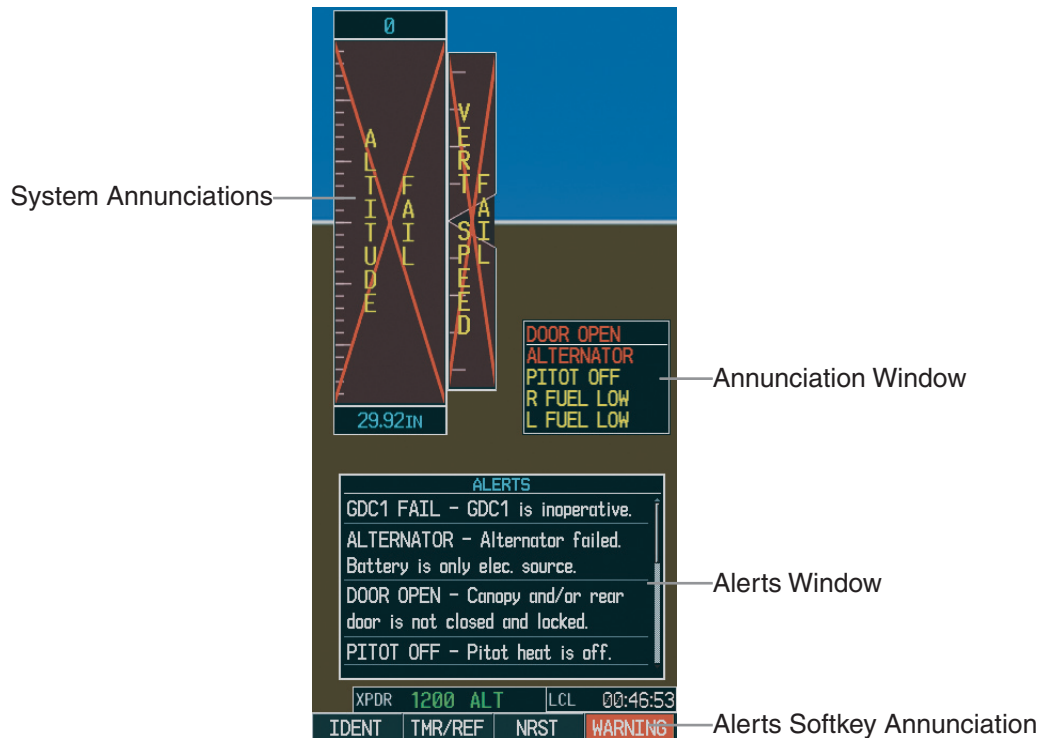


**Figure 5-2. Alerts & Annunciations**

The G1000 Alert System conveys alerts to the pilot using combinations of the following features:

### Annunciation Window:

The Annunciation Window displays abbreviated annunciation text. The Annunciation window is located to the right of the Altitude and Vertical Speed windows on the display. All 12 DA 40-specific annunciations can be displayed simultaneously.

### Alert Window:

The Alert window displays alert text messages. Up to 64 prioritized alerts can be displayed in the Alert window. Pressing the ALERTS softkey displays the Alerts window. Pressing the ALERTS softkey again removes the Alerts window from the display.

### Softkey Annunciation:

When the G1000 Alerting System issues an alert, the ALERTS softkey is used as a flashing annunciation to accompany the alert. During the alert, the ALERTS softkey assumes a new label consistent with the alert level (WARNING, CAUTION, or ADVISORY). Pressing the softkey annunciation acknowledges the presence of the alert and returns the softkey to its previous ALERTS label.

### System Failure Annunciations:

Typically, a large red X appears in windows when a failure is detected in the LRU providing the information to the window.

---

The G1000/DA 40 Alert System uses three levels:

**WARNING:**

This level of alert requires immediate pilot attention. A warning alert is accompanied by an annunciation in the Annunciation Window. Warning alert text appearing in the Annunciation Window is always RED. A warning alert is also accompanied by a flashing WARNING softkey annunciation, as shown Figure 5-3, along with a continuous aural tone. Pressing the WARNING softkey acknowledges the presence of the warning alert and stops the aural tone. Pressing the ALERTS softkey displays the related alert message in the Alert Window.



**Figure 5-3. WARNING Softkey Annunciation**

**CAUTION:**

This level of alert indicates the existence of abnormal conditions on the aircraft that may require pilot intervention. A caution alert is accompanied by an annunciation in the Annunciation Window. Caution alert text appearing in the Annunciation Window is yellow. A caution alert is also accompanied by a flashing CAUTION softkey annunciation, as shown in Figure 5-4, along with a single aural tone. Pressing the CAUTION softkey acknowledges the presence of the caution alert. Pressing the ALERTS softkey displays the related alert message in the Alert Window.



**Figure 5-4. CAUTION Softkey Annunciation**

**MESSAGE ADVISORY:**

This level of alert provides general information to the pilot. A message advisory alert does not appear in the Annunciation Window. A message advisory alert is only accompanied by a flashing ADVISORY softkey annunciation, as shown in Figure 5-5. Pressing the ADVISORY softkey acknowledges the presence of the message advisory alert and displays the advisory message in the Alert Window.



**Figure 5-5. ADVISORY Softkey Annunciation**

### 5.1.1 Aural & Audio Alerts

The G1000 system is capable of issuing audio and aural (voice) alerts for various situations. The following alerts are utilized by the G1000:

**Table 5-1. Aural and Audio Alerts**

| Alert Name                                                                                                        | Purpose                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 350, 1000, & 2500 Hz Tone                                                                                         | Various System Alerts                                                                                             |
| Beep Beep                                                                                                         |                                                                                                                   |
| Alert Ping                                                                                                        | G1000 Alert Issued                                                                                                |
| Traffic (male & female)                                                                                           | TIS Traffic Advisory                                                                                              |
| No Traffic (male & female)                                                                                        | TIS Traffic Unavailable                                                                                           |
| Alt Alert                                                                                                         | Altitude Alerting Function                                                                                        |
| "Caution Terrain, Caution Terrain" (voice) <i>and</i><br>"Terrain Ahead, Terrain Ahead" (voice)                   | TAWS <b>Caution</b> alert: Reduced required terrain clearance<br>Or Imminent impact with terrain.                 |
| "Terrain Terrain, Pull Up Pull Up" (voice) <i>and</i><br>"Terrain Ahead Pull Up, Terrain Ahead Pull Up"           | TAWS <b>Warning</b> alert: Reduced required terrain clearance<br>Or Imminent impact with terrain.                 |
| "Too Low Terrain" (voice)                                                                                         | TAWS <b>Caution</b> alert: Premature descent alert (PDA)                                                          |
| "Sink Rate" (voice)                                                                                               | TAWS <b>Caution</b> alert: Ground Proximity envelope 1, 2, or 3, Excessive Descent Rate                           |
| "Pull Up" (voice)                                                                                                 | TAWS <b>Warning</b> alert: Ground Proximity envelope 1, 2, or 3, Excessive Descent Rate                           |
| "Don't Sink" (voice) <i>and</i><br>"Too Low Terrain"                                                              | TAWS <b>Caution</b> alert: Ground Proximity altitude loss after takeoff                                           |
| "Five Hundred" (voice)                                                                                            | TAWS <b>Caution</b> alert: Ground proximity voice callout                                                         |
| "Caution Obstacle, Caution Obstacle" (voice)                                                                      | TAWS <b>Caution</b> alert: Obstacle awareness caution.                                                            |
| "Obstacle Obstacle Pull Up Pull Up" (voice) <i>or</i><br>"Obstacle Ahead Pull Up, Obstacle Ahead Pull Up" (voice) | TAWS <b>Warning</b> alert: Obstacle awareness warning.                                                            |
| "TAWS System Failure" (voice)                                                                                     | TAWS status alert: Terrain failure                                                                                |
| "TAWS Not Available" (voice)                                                                                      | TAWS status alert: Terrain not available                                                                          |
| "TAWS System Test, OK" (voice) (If passed) <i>or</i><br>"TAWS System Failure" (voice) (If test failed)            | TAWS status alert: Terrain self-test                                                                              |
| "TAWS Available" (voice)                                                                                          | TAWS status alert: Terrain available                                                                              |
| "Engaging Autopilot"                                                                                              | Automatic autopilot engagement alert after prolonged ESP mode activation (Enhanced GFC 700 with ESP option Only). |
| "Airspeed"                                                                                                        | Enhanced GFC 700 alert                                                                                            |
| "Incoming Call"                                                                                                   | Iridium Voice call alert (GDL 59 / GSR 56 Combination Option Only).                                               |

## 5.2 System Annunciations

If data fields become invalid due to an LRU failure, the PFD/MFD typically annunciates the failure with a large red X, as shown in Figure 5-6.

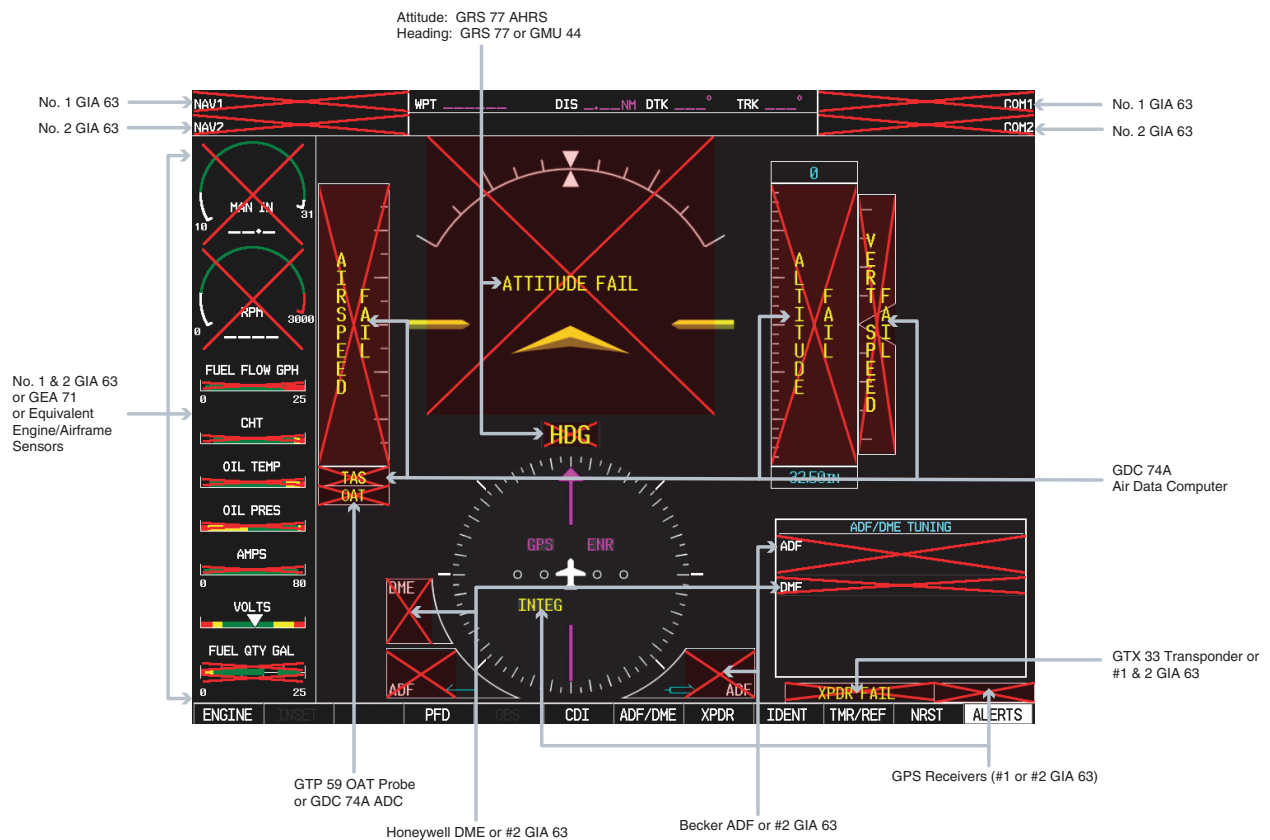


**Figure 5-6. System Annunciations**

## 5.2.1 System Failure Troubleshooting

The following table provides basic troubleshooting guidance for LRU failures:

**Table 5-2. System Failure Troubleshooting**

| Invalid Data Field                                                                                                       | Associated LRU(s) | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NAV1 & COM1<br>                         | GIA1              | Check configuration settings for GIA1 and the PFD.<br>Check Ethernet interconnect from GIA1 to the PFD.<br>Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective unit.</li> <li>✓ If problem persists, replace defective PFD.</li> </ul>                                                                                                                                                                                            |
| NAV2 & COM2<br>                         | GIA2              | Check configuration settings for GIA2 and the MFD.<br>Check Ethernet interconnect from GIA2 to the MFD.<br>Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective unit.</li> <li>✓ If problem persists, replace defective MFD.</li> </ul>                                                                                                                                                                                            |
| GPS LOI & Invalid Time Indications<br> | GIA1 or GIA2      | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Check GPS1 and GPS2 signal strength on the 3rd AUX page.<br>Check corresponding GPS antenna and cable.<br>Check Ethernet interconnect from PFD to GIA1 or MFD to GIA2.<br>Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective unit.</li> </ul> If problem persists, replace defective MFD or PFD. |
| XPDR FAIL<br>                         | GTX 33            | Check RS-232 configuration settings for GIA1, GIA2, and GTX 33.<br>Reload GTX Config File and verify the aircraft registration number is present, see Sections 3.5 and 7.5.<br>Replace defective GTX 33.                                                                                                                                                                                                                                                                                                               |

**Table 5-2. System Failure Troubleshooting (Cont)**

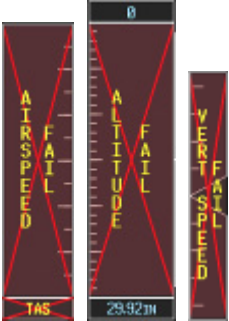
| Invalid Data Field                                                                                                                                        | Associated LRU(s) | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>TAS FAIL<br/>AIRSPEED FAIL<br/>ALTITUDE FAIL<br/>VERT SPEED FAIL</p>  | GDC 74A           | <p>Inspect GDC 74A pitot/static plumbing integrity.<br/>Inspect pitot/static ports and associated equipment.<br/>For TAS failure, also check GTP 59 OAT probe as stated below.<br/>Check GDC ARINC 429 configuration settings for the PFD, MFD, GIA1, and GIA2.</p> <ul style="list-style-type: none"> <li>✓ If PFD, MFD, and GIA configuration settings are correct, replace defective GDC configuration module according to Section 6.8.</li> <li>✓ If problem persists, replace defective GDC 74A.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>OAT</p>                                                               | GTP 59            | <p>See above guidance for GDC 74A troubleshooting.<br/>Check GDC config module wiring for damage, replace if any is found.<br/>Replace GDC 74A with a known good unit:</p> <ul style="list-style-type: none"> <li>✓ If problem persists replace defective GTP 59A.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>ATTITUDE FAIL</p>                                                   | GRS 77            | <p>Ensure the GRS 77 is fastened down tightly in it's mounting rack and that the mounting rack is not loose (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed).<br/>Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important for an ATTITUDE FAIL that appears during ground operation only.<br/>Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br/>Cycle power to restart initialization.<br/>Load configuration files to the PFD, MFD, GIA1, and GIA2<br/>Ensure GRS connector is secure and proper wire harness strain relief is provided.<br/>Perform an Engine Run-Up Test to check if engine vibration is causing the GRS 77 to go offline.<br/>Calibrate the GRS 77 (Pitch/Roll Offset and Magnetometer Calibration):</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective GRS 77 and GRS 77 configuration module.</li> </ul> <p>Contact Garmin Aviation Product Support if condition continues after replacing the GRS 77 and config module for additional assistance.</p> |

**Table 5-2. System Failure Troubleshooting (Cont)**

| Invalid Data Field                                                                 | Associated LRU(s) | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | GRS 77 & GMU 44   | <p>Ensure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer and aircraft is not in hangar or near buildings.</p> <p>Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.</p> <p>Cycle power, after moving aircraft away from metal objects, to determine if metal objects were the source of the problem.</p> <p>Ensure GRS 77 and GMU 44 connectors are secure.</p> <p>Check the wiring and any inline connectors between the GRS and GMU for faults.</p> <p>Perform a Magnetometer Interference Test to check for interference from onboard electrical system components (e.g. NAV lights). Pay particular attention to any new electrical devices that have been installed since the aircraft was new. Correct any discrepancies that do not allow this test to pass before continuing.</p> <p>Recalibrate the GMU 44</p> <p>Load configuration files to the PFD, MFD, GIA1, and GIA2:</p> <p>If problem persists replace the GRS 77 with a known good unit:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective GMU 44.</li> <li>✓ If problem persists, replace the GRS 77.</li> </ul> |
|  | GRS 77 & GMU 44   | <p>This message is normal for approximately one minute after initial powerup.</p> <p>Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.</p> <p>Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0.</p> <p>If this message persists, see section 5.13.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Table 5-2. System Failure Troubleshooting (Cont)**

| Invalid Data Field                                                                                                              | Associated LRU(s) | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>ENGINE/AIRFRAME SENSORS (ALL INVALID)</p>  | <p>GEA 71</p>     | <p>If software was loaded to a new GDU display, be sure that the user settings for the replaced display were cleared. Clear user settings by pressing the CLR key on the replaced display while applying power to it. Acknowledge the on-screen prompt by pressing the ENT key or the right-most softkey.</p> <p>Ensure the GEA is online (green checkmark on the AUX – SYSTEM STATUS page) .</p> <ul style="list-style-type: none"> <li>✓ If GEA is not online verify unit is receiving power.</li> <li>✓ If problem persists, check GIA/GEA interconnects.</li> <li>✓ If problem persists, load configuration files to both GIA's and both GEA's.</li> <li>✓ If problem persists, replace the GEA 71</li> </ul> <p>Check corresponding engine/airframe sensors and wiring</p> <p>Check for GEA related alert messages on the PFD.</p> <p>Verify GEA internal power supply, configuration, and calibration status in configuration mode.</p> <ul style="list-style-type: none"> <li>✓ Configuration and calibration boxes should be green. If they are red, replace the GEA 71.</li> <li>✓ With GDU software version 4.00 or higher, the INT PWR SUPPLY box should be green. If red check for shorts on power sensor input and check corresponding engine/airframe sensors and wiring. Systems with GDU software versions less than 4.00 will display a red box, indicating proper operation.</li> </ul> <p>Verify internal, external, and reference voltages listed in the Main Analog and I/O A Analog boxes are not dashed out (does not include Aircraft Power 1 and 2).</p> <ul style="list-style-type: none"> <li>✓ If any voltages are dashed out, replace GEA 71.</li> </ul> <p>Load configuration files to both GIA's and the GEA.</p> <p>Replace GEA configuration module and backshell thermocouple (only for red X'd engine temperatures):</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective GEA 71</li> </ul> |

## 5.2.2 Engine/Airframe Instrument Failures

The following table provides guidance for troubleshooting individual engine/airframe sensor failures. Be sure to also follow previous guidance given for the GEA 71. The technician should troubleshoot to isolate the fault by checking sensor-to-GEA wiring, replacing the suspect sensor, and finally by replacing the GEA 71. Replace one part at a time. Refer to Section 7.4.2 to check for correct operation of the sensors and GEA 71 after any part has been replaced.

**Table 5-3. Engine Airframe Instrument Failures**

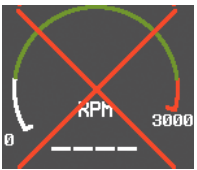
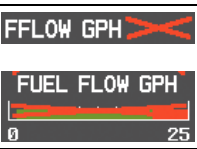
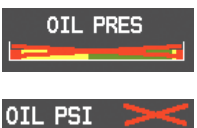
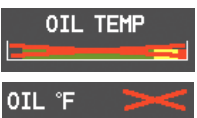
| Invalid Field                                                                       | Sensor                     | Solution                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Tachometer                 | Check tachometer – GEA wiring.<br>Replace tachometer sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                                        |
|    | MAP Sensor<br>(DA 40 Only) | Check MAP sensor – GEA wiring.<br>Replace MAP sensor. Refer to G1000/DA40 Install Drawing 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                                                |
|    | Fuel Pressure              | Check fuel pressure sensor – GEA wiring.<br>Troubleshoot/replace fuel pressure sensor. Refer to the G1000/DA40 Install Drawing, 005-00304-00 for DA 40, and OAM 40-222 for DA 40 F.                                                                                                                                                                                                                           |
|   | Fuel Flow                  | Check fuel flow sensor – GEA wiring.<br>Replace fuel flow sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                                   |
|  | CHT Probes<br>(4)          | <u>For one CHT indicator that is flagged, check the following:</u><br>Check CHT probe – GEA wiring.<br>Replace CHT probe. Refer to G1000/DA40 Install 005-00304-00 or OAM 40-222 for DA 40 F.<br><br><u>If all 4 CHT indicators are flagged, check the following:</u><br>Replace backshell thermocouple and/or configuration module in GEA connector. See Sections 6.12 & 6.13..<br>Replace defective GEA 71. |
|  | EGT Probes<br>(4)          | <u>For one EGT indicator that is flagged, check the following:</u><br>Check EGT probe – GEA wiring.<br>Replace EGT probe. Refer to G1000/DA40 Install 005-00304-00 or OAM 40-222 for DA 40 F.<br><br><u>If all 4 EGT indicators are flagged, try the following:</u><br>Replace backshell thermocouple and/or configuration module in GEA connector. See Sections 6.12 & 6.13..<br>Replace defective GEA 71.   |
|  | Oil Pressure Sensor        | Check oil pressure sensor – GEA wiring.<br>Replace oil pressure sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                             |

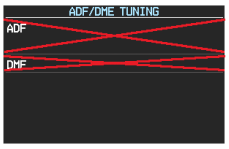
**Table 5-3. Engine Airframe Instrument Failures (Cont)**

| Invalid Field                                                                     | Sensor                    | Solution                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Oil Temperature Sensor    | Check oil temperature sensor – GEA wiring.<br>Replace oil temperature sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71. |
|  | Alternator Current Sensor | Check current sensor sensor – GEA wiring.<br>Replace current sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.          |
|  | Fuel Quantity Sensors (2) | Check fuel quantity sensor – GEA wiring.<br>Replace fuel quantity sensor. Refer to the DA40 AMM.<br>Replace defective GEA 71.                                                           |

### 5.2.3 ADF/DME Failure

Effective System Software Version 0369.08 or later, an ADF and DME interface were added as an option. The PFD functions as a control head for the remote-mounted Becker ADF and Honeywell DME. A DME or ADF failure is represented by the following red X's.

**Table 5-4. ADF/DME Failure**

| Invalid Field                                                                                                                                                                                                                                                    | Sensor                       | Solution                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><br> | Becker ADF and Honeywell DME | Ensure that GIA 63 #2 is properly functioning.<br><br>Reload the ADF or DME option configurations.<br><br>Check for proper operation of the ADF or DME receivers. Ensure that each is receiving power.<br><br>Check ADF – GIA2 and DME – GIA2 interconnect. Refer to Diamond wiring diagram for details.<br><br>Replace ADF or DME unit(s). |

### 5.3 DA 40/DA 40 F Specific Alerts

The following alerts are configured specifically for the DA 40 and DA 40 F:

**Table 5-5. Warning Alerts**

| Annunciation Window | Alert Message                                                                                                             | Solution                                                                                                                                                                                                            |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALTERNATOR          | Alternator failed. Battery is only elec. source.                                                                          | Check alternator current sensor for proper operation.<br>If current sensor is OK, troubleshoot alternator & aircraft electrical system according to DA 40 Airplane Maintenance Manual instructions.                 |
| OIL PRES LO         | Oil pressure is below 25 psi.                                                                                             | Check aircraft oil level.<br>Troubleshoot oil pressure sensor for proper operation.<br>If oil pressure sensor is OK, troubleshoot engine oiling system according to DA 40 Airplane Maintenance Manual instructions. |
| FUEL PRES LO        | <i>For DA 40:</i><br>Fuel pressure is below 14 psi.<br><i>For DA 40 F:</i><br>Fuel Pressure is below 1 psi.               | Troubleshoot fuel pressure sensor for proper operation.<br>If fuel pressure sensor is OK, troubleshoot fuel pump and associated fuel systems per DA 40 Airplane Maintenance Manual instructions.                    |
| FUEL PRES HI        | <i>For DA 40:</i><br>Fuel pressure is greater than 35 psi.<br><i>For DA 40 F:</i><br>Fuel pressure is greater than 8 psi. |                                                                                                                                                                                                                     |
| STARTER ENGD        | Starter clutch is engaged while engine is running.                                                                        | Troubleshoot starting system per DA 40 Airplane Maintenance Manual.<br>Check wiring from starter to the GEA 71 (Analog IN 6 Hi & Lo, Pins 62 and 63, respectively).                                                 |
| DOOR OPEN           | Canopy and/or rear door is not closed and locked.                                                                         | Close canopy and/or rear door.<br>If alert does not disappear, check canopy/door discrete sensor for proper operation.                                                                                              |
| TRIM FAIL*          | Autopilot automatic trim has failed.                                                                                      | Troubleshoot autopilot per DA 40 Airplane Maintenance Manual instructions.                                                                                                                                          |

\*KAP140 aircraft only

**Table 5-6. Caution Alerts**

| Annunciation Window | Alert Message                               | Solution                                                                                                                                                      |
|---------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L FUEL LOW          | Left fuel quantity is less than 3 gallons.  | Check fuel level.<br>If reading is inaccurate, recalibrate fuel probes per Section 4.6.                                                                       |
| R FUEL LOW          | Right fuel quantity is less than 3 gallons. |                                                                                                                                                               |
| LOW VOLTS           | On-board voltage is below 24 volts.         | Inspect GEA 71 connector & wiring.<br>Troubleshoot aircraft electrical system according to DA 40 Airplane Maintenance Manual instructions.                    |
| PITOT FAIL          | Pitot heat is inoperative.                  | Check pitot heat switch position.<br>Inspect GEA 71 connector & wiring.<br>Troubleshoot pitot heat system per DA 40 Airplane Maintenance Manual instructions. |
| PITOT OFF           | Pitot heat is off.                          |                                                                                                                                                               |

|                       |                                                             |                                                                                                                                                                  |
|-----------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PFD FAN FAIL</b>   | PFD FAN FAIL – The cooling fan for the PFD is inoperative.  | Ensure that the CDU FAN and/or AV FAN circuit breakers are closed.                                                                                               |
| <b>MFD FAN FAIL</b>   | MFD FAN FAIL – The cooling fan for the MFD is inoperative.  | Perform visual inspection of fan operation per Section 4.13 of this document.<br>Check cooling fan wiring.                                                       |
| <b>GIA FAN FAIL</b>   | GIA FAN FAIL – The cooling fan for the GIAs is inoperative. | Replace cooling fan. Refer to 005-00304-00 for installation drawings.                                                                                            |
| <b>PFD OVERHEAT</b>   | PFD1 COOLING – PFD has poor cooling. Reducing power usage.  | Perform visual inspection of fan operation per Section 4.13 of this document. Replace cooling fan if necessary. Refer to 005-00304-00 for installation drawings. |
| <b>MFD OVERHEAT</b>   | MFD1 COOLING – MFD has poor cooling. Reducing power usage.  |                                                                                                                                                                  |
| <b>GIA 1 OVERHEAT</b> | GIA1 COOLING – GIA1 over temperature.                       | Check Avionics Fan for proper operation.                                                                                                                         |
| <b>GIA 2 OVERHEAT</b> | GIA2 COOLING – GIA2 over temperature.                       | Replace affected GIA.<br>If problem persists contact Garmin.                                                                                                     |

\*SW v0321.23 and later only.

**Table 5-7. Message Advisory Alerts (SW v0321.22 and earlier)**

| <b>Message Advisory</b>                                     | <b>Solution</b>                                                                                            |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| PFD FAN FAIL – The cooling fan for the PFD is inoperative.  | Ensure that the CDU FAN and/or AV FAN circuit breakers are closed.                                         |
| MFD FAN FAIL – The cooling fan for the MFD is inoperative.  | Perform visual inspection of fan operation per Section 4.13 of this document.<br>Check cooling fan wiring. |
| GIA FAN FAIL – The cooling fan for the GIAs is inoperative. | Replace cooling fan. Refer to 005-00304-00 for installation drawings.                                      |

### **NOTE**

From this point forward, all message advisory alerts presented are common to all G1000 systems and are not specific to the DA 40. Messages are grouped according to LRU.

## 5.4 TAWS Troubleshooting

**Table 5-8. TAWS Troubleshooting**

| Annunciation                                                                                                                                                                                                                            | Cause                                                | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        | A TAWS system failure has occurred.                  | <p>If message occurred on the first power up after unlocking TAWS, cycle power to initialize TAWS.</p> <p>Ensure each GDU contains the correct database data card</p> <p>Ensure the G1000 is configured for TAWS:</p> <ul style="list-style-type: none"> <li>✓ If the system is not configured for TAWS, reconfigure per Section 3.5.9.</li> </ul> <p>Verify GIA #1 is online.</p> <p>Ensure a database or GDU SW mismatch has not occurred.</p> <ul style="list-style-type: none"> <li>✓ If a mismatch has occurred, load correct database/software files or replace the terrain card.</li> </ul> |
|                                                                                                                                                        | TAWS system is currently being tested.               | N/A – Test will be conducted up to two minutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                        | TAWS system alerting is disabled.                    | Enable TAWS system alerting by pressing the INHIBIT softkey on the MAP – TAWS page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>(SW v0321.19 or earlier):</p>  <p>(SW v0321.22 or later):</p>  | GPS system integrity not high enough to enable TAWS. | <p>Ensure valid GPS position is received from the AUX – GPS STATUS page.</p> <p>Check GPS antenna &amp; associated coaxial cabling.</p> <p>Troubleshoot GIAs.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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## 5.5 GFC 700 AFCS Troubleshooting

The GFC 700 is a digital Automatic Flight Control System (AFCS) which is integrated into various components of the G1000. This section touches upon key items to note while troubleshooting the GFC 700.

Should a problem be encountered during the operation of the GFC 700, the pilot and technician should first evaluate the overall status and condition of the G1000 system at the AUX – System Status page (on MFD). Any alert messages, annunciations, or other abnormal behaviors should be noted in an effort to pinpoint the fault. The object is to locate the fault within a LRU or LRUs in efforts to replace the defective equipment.

The GFC 700 AFCS Annunciation field is located above the airspeed tape on the PFD as shown:



**Figure 5-7. AFCS Annunciation Field**

### 5.5.1 General AFCS Troubleshooting

The following annunciations may appear in the AFCS Annunciation field:

**Table 5-9. AFCS Annunciation Troubleshooting**

| Annunciation                                                                        | Condition               | Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | AFCS System Failure     | <p>Ensure that the G1000 system is in proper working order. Check specifically for proper operation of the:</p> <ul style="list-style-type: none"><li>• GIA 63 Integrated Avionics Unit</li><li>• GRS 77 AHRS</li><li>• GDC 74A Air Data Computer</li><li>• All GSA 81 Servos (Check AFCS Breaker IN)</li></ul> <p>Check that no red X's are present on the MFD and PFD.</p> <p>Check that no related alert messages are present on the PFD (press the ALERTS softkey).</p> <p>Go to the AUX SYSTEM STATUS page on the MFD and verify that all LRUs have a 'green' check.</p> <p>In Configuration mode, review the GFC 700 equipment status, software, and certification gains.</p> <p>Reload software, configuration, and certification gains to the GIAs and GSA 81 servos.</p> <p>Check the GFC Status page for additional GFC 700 system information.</p> <p>Review the fault and assert logs for the GIAs and servos (see Section 5.5.3)</p> <p>Isolate the fault to an LRU, airframe switch or wiring using the information from the fault log. Contact Garmin Aviation Product Support for assistance if needed..</p> |
|  | Pitch Axis Failure      | Check the AUX – SYSTEM STATUS page to see if the servo is online (green check).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|  | Pitch Trim Axis Failure | Check that the affected servo is receiving power.<br>Ensure the MET switches are not stuck.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|  | Roll Axis Failure       | Check the servo wiring and connector.<br>If failure condition still exists, remove and replace the affected servo.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|  | AHRS Monitor Failure    | If the AHRS inputs have been determined to be “unreasonable” while the AP is engaged, in air, this message will be displayed until AHRS inputs are determined reasonable for 5 seconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 5-9. AFCS Annunciation Troubleshooting (Cont)**

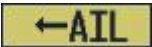
| Annunciation                                                                      | Condition              | Resolution                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Elevator Mis-Trim Down | If elevator mistrim annunciations persist, check the pitch and pitch trim servos for proper operation. Verify that the servo is online at the AUX – SYSTEM STATUS page.<br><br>Check the servo wiring and connectors. Ensure the servo is receiving power. |
|  | Elevator Mis-Trim Up   | Check the aircraft control adjustments.<br><br>If mistrim condition still exists, remove and replace the affected servo.                                                                                                                                   |
|  | Aileron Mistrim Right  | Check for possible fuel imbalance.<br><br>Check aileron control adjustments.                                                                                                                                                                               |
|  | Aileron Mistrim Left   | If mistrim condition still exists remove and replace the roll servo.                                                                                                                                                                                       |
|  | Pre-Flight Test Fails  | Allow the system to complete pre-flight tests.                                                                                                                                                                                                             |
|  |                        | The preflight test should finish within 2 minutes. If it does not pass, the red 'PFT' annunciation is shown. In case of PFT failure, see Sections 5.5.3 and 5.5.4 for additional PFT diagnostics.                                                          |

**Table 5-10. AFCS General Troubleshooting**

| Condition                                                  | Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Poor AP Performance<br>(Limited AP Authority)              | Check each servo mount slip clutch per Section 4.10. Verify the clutches are not excessively loose and are within torque limits.<br><br>Check aircraft controls for proper balancing and adjustment per the DA40 AMM.                                                                                                                                                                                                                                                                                       |
| AP DISC Problems                                           | For intermittent nuisance disconnects with no AFCS or PFT alert, check A/P disconnect switch and wiring for intermittent faults.<br><br>If an AFCS or PFT alert is displayed at the time of the disconnect, troubleshoot per Table 5-9.<br><br>Check the GIA AFCS Fault Logs according to Section 5.5.3. If a <b>Mon Prmtr Invalid</b> message is received, check for valid true airspeed. A faulty GTP 59 OAT probe may cause TAS to become invalid, which will flag the <b>Mon Prmtr Invalid</b> message. |
| Manual Electric Trim Failure                               | Check pitch trim servo status.<br><br>Check MET switch discrete inputs to both GIAs by going to the GIA I/O Configuration page and selecting DISCRETE IN inputs.                                                                                                                                                                                                                                                                                                                                            |
| AutoTrim Failure (Trim does not run while flaps in motion) | Check flap-in-motion discrete inputs to both GIAs for proper operation by going to the GIA I/O Configuration page and selected DISCRETE IN inputs. See Section 4.9.<br><br>If continually 'open' troubleshoot flap motor & discrete input wiring (refer to DA40 AMM).                                                                                                                                                                                                                                       |

## 5.5.2 GFC Status Page

The GFC Status page is presented in configuration mode and gives status information regarding the GFC 700.

The screenshot displays the GFC STATUS page with the following sections:

- SELECT GIA UNIT:** GIA 1
- SELECT SERVO AXIS:** PITCH SERVO
- GIA STATUS:** AP DISCONNECT (Green checkmark)
- MONITOR BOARD STATUS:**
  - SERVO PROGRAM 1 (Green checkmark)
  - SERVO PROGRAM 2 (Red X)
  - SERVO PROGRAM 3 (Red X)
  - AP DISCONNECT (Green checkmark)
  - PFT (PASSED)
  - HIGH RES LOAD CELL CAL (Green checkmark)
  - HIGH RNG LOAD CELL CAL (Green checkmark)
- CONTROL BOARD STATUS:**
  - SERVO PROGRAM 1 (Green checkmark)
  - SERVO PROGRAM 2 (Red X)
  - SERVO PROGRAM 3 (Red X)
  - AP DISCONNECT (Green checkmark)
  - PFT (PASSED)
- DRIVE SERVO:** RPM 0.00rpm
- SERVO DATA:**
  - VOLTAGE 0.00V
  - CURRENT 0.00A
  - SPEED 0.00rpm
  - TORQUE -0.1in-lb
  - CLUTCH ENGAGE STATUS (Green checkmark)
- SLIP CLUTCH TEST RESULTS:**
  - NOSE UP: MIN \_\_\_\_in-lb, MAX \_\_\_\_in-lb
  - NOSE DOWN: \_\_\_\_in-lb, \_\_\_\_in-lb
- Footer:** TEST YSAS TEST SV0 TEST ALL DIS CLCH DRV SRVO RST GAIN

Figure 5-8. GFC Status Page

### GIA STATUS

**AP DISCONNECT:** Shows the condition of the AP DISC +28 VDC input to the GIAs and servos, which is required for the Autopilot to operate. A green status indicator shows the AP DISC switch is closed and the GFC 700 is actively receiving 28. volts. A black indicator box indicates the GIAs and servos are no longer receiving the +28 VDC AP DISC power (switch open or other fault).

### MONITOR/CONTROL BOARD STATUS

Shows the condition of various monitor board components.

**SERVO PROGRAM (1-3):** Servo program discreets are used to determine the HW strapping for each GSA to define the servo type. This information can be cross-referenced against the system interconnects to verify proper servo grounding.

**AP DISCONNECT:** Same as GIA Status.

**PFT:** Indicates whether the pre-flight test has passed or failed.

**HIGH RES & HIGH RNG LOAD CELL CAL:** Shows the condition of the high resolution and high range load cells on the monitor board. If box is black, this indicates a corrupt or missing load cell calibration; return the servo to Garmin.

### DRIVE SERVO

Allows the technician to enter a desired RPM at which to electronically drive the selected servo. Direction of rotation is controlled by the polarity of the RPM (+ or -). After the speed is entered, the technician may use the ENG CLCH and DRV SRVO softkeys to drive the servo.

### NOTE

Be certain that the flight controls are clear and safe to operate before electronically driving the servo.

---

## **SERVO DATA**

Shows real-time reported data including servo voltage, speed, motor current, load cell torque, and clutch solenoid status. A green box indicates the servo clutch is engaged.

## **SLIP CLUTCH TEST RESULTS**

This window is used during the GSM 86 automatic slip clutch torque measurement check.

### **IMPORTANT!**

**This automated clutch check method is NOT approved as an acceptable means of compliance with the annual slip clutch maintenance requirements in Section 4.10 for the GSM 85. The GSM 85 servo mounts MUST be removed from the aircraft and tested in accordance with Section 4.10.1 to satisfy this requirement.**

---

### 5.5.3 GIA Fault Log Descriptions

The section is meant to help determine why the GFC 700 has failed the pre-flight test. A failed pre-flight test is indicated by a  indication in the AFCS Annunciation field. There are 16 steps to the GFC 700 pre-flight test.

#### **NOTE**

A thorough understanding of the G1000 system in Configuration mode is recommended before you start this procedure.

1. Start the G1000 in Configuration mode.
2. Use the FMS knob on the PFD to go to the Diagnostics Terminal page in the System group. This page allows the technician to view maintenance logs associated with the GFC 700.
3. Using the FMS knob choose GIA 1 or GIA 2 in the LRU window.
4. Using the FMS knob choose VIEW MAINTENANCE LOG in the COMMAND window.
5. Press the ENT key.
6. Scroll through the OUTPUT list by pressing the OUTPUT softkey.

The GIA will log any of the following faults:

#### **FCS Task not started: Bad gains**

The FCS task has not started because the gains are not present or have been corrupted.

*Reload the gain files to correct.*

#### **FCS Task not started: Gain structure out of range**

The FCS task has not started because the gains are not compatible with the GIA software.

*Reload the gain files to correct.*

#### **PFT FAIL: Timeout, <STEP>**

Pre-flight test has failed because the specified step has not passed in the allotted time. See the GIA pre-flight steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.

#### **PFT FAIL: Cross GIA Failed, State: <STEP>**

Pre-flight test has failed on opposite GIA. <STEP> specifies the pre-flight test step on selected GIA that was in progress when the pre-flight test failed on the opposite GIA. See the GIA pre-flight steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.

---

**PFT FAIL: <STEP>**

Pre-flight has failed because the step specified has failed. See the GIA pre-flight test steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.

**AHRS MON invalid: <STATE>**

The AHRS monitor has detected that the AHRS data is invalid. The possible values for <STATE> are:

- a. **Mon Prmtr Invalid:** The ARINC 429 data used by one of the monitors has not been received.
- b. **Attitude Prmtr Invalid:** The ARINC 429 pitch or roll angle has not been received.
- c. **Exceeded Attitude Limits:** The pitch or roll angle has exceeded the engagement limits.
- d. **Cross Hdg Accel Fail:** Cross heading acceleration monitor failed.
- e. **Vert Accel Fail:** Vertical acceleration monitor failed.
- f. **Fltrd Cross Hdg Accel Fail:** Filtered cross heading acceleration monitor failed.
- g. **Fltrd Vert Accel Fail:** Filtered vertical acceleration monitor failed.
- h. **Roll Accel Fail:** Roll acceleration monitor has failed.
- i. **Normal Accel Fail:** Normal acceleration has failed.

*Troubleshoot the GRS 77 for the cause of the failure.*

**Stuck switch invalidated parameter: <AXIS>**

A MET switch in the specified axis is stuck.

*Check the MET (trim) switches for proper operation.*

**PRMTR: <PARAMETER> MODE:<MODE> Parameter lost**

The mode specified by <MODE> has been disengaged because the parameter specified by <PARAMETER> has become invalid. The following is a list of some of the possible values for <PARAMETER>:

- a. **AD TDM Comm Valid:** The specified mode has been disengaged because communication with the servos, via the Time Division Multiplexer protocol, has been lost.
- b. **AP Pitch MET not stuck:** The specified mode has been disengaged due to a stuck pitch MET switch.

*Check the MET (trim) switches for proper identification.*

---

## 5.5.4 GIA Pre-Flight Test Steps

### Step 0: System initializing, verify GFC powered

This step checks to ensure the GFC is powered up.

*Ensure the GIA is connected to the autopilot disconnect on the GFC Configuration page.*

*Ensure all configured servos are communicating on the System Status page.*

### Step 1: System initializing, verify GIA audio is valid

This step checks to ensure the GIA audio region has been loaded and configured.

*Load GIA audio files to correct.*

### Step 2: System initializing, verify required servos are configured

This step checks to ensure the current servo configuration matches the servo configuration specified in the certification gain file.

*Reload the gain files to correct.*

### Step 3: System initializing, verify selected side

This step checks to ensure the PFD is online and sending the selected AFCS side data over HSDB to the GIA.

*Ensure the PFD is turned on.*

*Ensure the Ethernet connection from the PFD to the GIA is functioning.*

### Step 4: System initializing, verify AHRS monitor

This step checks to ensure the AHRS monitor is valid and not reporting an AHRS failure. NOTE: AHRS monitor will be assumed valid if on the ground.

*Ensure the GRS 77 and GDC 74 are turned on and sending valid data.*

### Step 5: System initializing, verify configured servos are valid

This step checks to ensure that none of the servos are reporting any type of failure. Note that trim servos will report a failure on stuck MET switches.

*Ensure MET switch is not stuck.*

*Cycle power on all servos.*

### Step 6: System initializing, verify cross GIA valid

This step checks to ensure the cross-side GIA is online and communicating with all servos from ARINC 485 data lines. The cross-side GIA must also pass its AHRS monitoring.

*Ensure both GIAs are online and communicating with all servos.*

### Step 7: Verify cross GIA initialized

This step checks to ensure the cross-side GIA is initialized.

*Cycle power on all servos and GIAs.*

*Ensure the PFD and MFD are turned on.*

---

**Step 8: Verify servo type**

This step checks to ensure the servos are correct type.

*Verify servos are correct type.*

**Step 9: Verify servo first certification data**

This step checks to ensure the servos and the GIAs have the same certification gains.

*Reload the certification gains to all GIAs and servos.*

**Step 10: Verify servo second certification data**

This step checks to ensure the servos and the GIAs have the same certification gains.

*Reload the certification gains to all GIAs and servos.*

**Step 11: Updating servo RTC**

This step sets the servo system time to the GIA system time.

**Step 12: Verify servo PFT status**

This step checks to ensure all servos have passed their own pre-flight test.

**Step 13: Verify AP disconnect enabled**

This step checks to ensure GIA 1, GIA 2, and all servos are connected to the 28 volt autopilot disconnect.

*Ensure the autopilot disconnect is connected to all GIAs and servos and is registering 28 volts.*

*Ensure the autopilot disconnect switch is not pressed.*

**Step 14: Verify servo validity**

This step checks to ensure all servos are online and communicating with valid data.

*Ensure all servos are turned on and communicating.*

**Step 15: Verify cross GIA PFT is completed**

This step checks to ensure the cross-side GIA is also on step 14.

*Cycle power on all servos and GIAs.*

*Ensure the PFD and MFD are turned on.*

**Step 16: PFT completed**

The pre-flight test is successfully completed.

**Step 17: PFT failed**

The pre-flight test has failed.

## 5.5.5 Servo Faults and Troubleshooting

Whenever a servo fault occurs, a status message is logged to the corresponding servo control or monitor maintenance log. This information is also accompanied by a time and date stamp. An "RTC DATE" entry is made every time a servo is powered on, it is normally not useful for troubleshooting.

The following is a listing of possible faults that could be reported in a GSA fault log. Faults can occur in either the monitor board processor or the control board processor, both of which are contained in the GSA unit.

### 5.5.5.1 Monitor Processor

The monitor processor contains the logs that are found in these processors -

- 2 – Pitch Servo
- 4 – Roll Servo
- 8 – Pitch Trim Servo

There are two main groupings of faults that can occur in the monitor processor:

The first grouping of faults can occur during the GSA unit pre-flight test (PFT). If there is a fault during PFT the unit will not be able to transition to normal mode and the only way to clear this state would be to cycle unit power.

The second grouping of faults can occur during normal mode. These faults generally cause a disconnect of power to the GSA and report that a fault has occurred to the GIA.

The Notes column indicates any actions that can be taken to troubleshoot the problem in the aircraft by the technician. Any faults that are not listed here indicate an internal problem requiring replacement of the servo. If the items in the Notes column check out ok, replace the servo.

**Table 5-11. PFT Faults (Monitor Processor)**

| MONITOR PFT STEP        | NOTES                                                                                                              |
|-------------------------|--------------------------------------------------------------------------------------------------------------------|
| "INTERNAL COMM FAIL "   | This can sometimes be a result of a failure on the other internal servo board, check faults on the other processor |
| "UNSW POWER INV"        | Check unit power                                                                                                   |
| "MON SOL PWR ON FAIL "  | Check unit power and AP Disconnect power                                                                           |
| "CTL SOL PWR ON FAIL "  | Check unit power and AP Disconnect power                                                                           |
| "SOL PWR FAIL "         | Check unit power and AP Disconnect power                                                                           |
| "CERT DATA UNINSTALLED" | Upload the certification gain file to the Monitor board                                                            |
| "STRAP CODE MISMATCH"   | Check the connector strap inputs to the unit                                                                       |

**Table 5-12. Normal Mode Faults (Monitor Processor)**

| MONITOR FAULT     | NOTES                                        |
|-------------------|----------------------------------------------|
| "GIA DIS FAULT"   | Check the AP Disconnect power into the unit  |
| "HOST DATA DIF"   | Check the AHRS wiring to the system          |
| "HOST DATA INV"   | Check the AHRS wiring to the system          |
| "SVO PWR INV"     | Check unit power and AP Disconnect power     |
| "STRP CODE CHNG"  | Check the connector strap inputs to the unit |
| "MET STUCK SWTCH" | Check the MET switch inputs into the system  |
| "MET STATUS DIF"  | Check the MET switch inputs into the system  |

---

### 5.5.5.2 Control Processor

The control processor contains the logs that are found in these processors –

3 – Pitch Servo

5 – Roll Servo

9 – Pitch Trim Servo

There are two main groupings of faults that can occur in the control processor.

The first grouping of faults can occur during the GSA unit pre-flight test (PFT). If there is a fault during PFT the unit will not be able to transition to normal mode and the only way to clear this state would be to cycle unit power.

The second grouping of faults can occur during normal mode. These faults generally cause a disconnect of power to the GSA and report that a fault has occurred to the GIA.

The Notes column indicates any actions that can be taken to troubleshoot the problem in the aircraft by the technician. Any faults that are not listed here indicate an internal problem requiring replacement of the servo. If the items in the Notes column check out ok, replace the servo.

**Table 5-13. PFT Faults (Control Processor)**

| CONTROL PFT STEP        | NOTES                                                                                           |
|-------------------------|-------------------------------------------------------------------------------------------------|
| "INT COMM TEST FAIL"    | This can sometimes be a result of a failure on the other board, check faults on other processor |
| "CTL MOT PWR ON FAIL"   | Check unit power and AP Disconnect power                                                        |
| "MON MOT PWR ON FAIL"   | Check unit power and AP Disconnect power                                                        |
| "HALL 1 FAIL"           | Check unit power and AP Disconnect power                                                        |
| "HALL 2 FAIL"           | Check unit power and AP Disconnect power                                                        |
| "HALL 3 FAIL"           | Check unit power and AP Disconnect power                                                        |
| "HALL 4 FAIL"           | Check unit power and AP Disconnect power                                                        |
| "HALL 5 FAIL"           | Check unit power and AP Disconnect power                                                        |
| "HALL 6 FAIL"           | Check unit power and AP Disconnect power                                                        |
| "CURR OFFST FAIL"       | Check unit power and AP Disconnect power                                                        |
| "SVO TYPE FAIL"         | Check unit power and AP Disconnect power                                                        |
| "CERT DATA UNINSTALLED" | Upload the certification gain file to the Control board                                         |
| "STRAP CODE MISMATCH"   | Check the connector strap inputs to the unit                                                    |

**Table 5-14. Normal Mode Faults (Control Processor)**

| CONTROL FAULT     | NOTES                                        |
|-------------------|----------------------------------------------|
| "GIA DIS FAULT"   | Check the AP Disconnect power into the unit  |
| "HOST DATA DIF"   | Check the AHRS wiring to the system          |
| "HOST DATA INV"   | Check the AHRS wiring to the system          |
| "SVO PWR INV"     | Check unit power and AP Disconnect power     |
| "STRP CODE CHNG"  | Check the connector strap inputs to the unit |
| "MET STUCK SWTCH" | Check the MET switch inputs into the system  |
| "MET STATUS DIF"  | Check the MET switch inputs into the system  |

---

## 5.5.6 Downloading GIA and GSA Maintenance Logs

If additional assistance is needed troubleshooting autopilot faults, the Maintenance logs can be downloaded to an SD card as a text file (.txt) and emailed to Garmin Aviation Product Support at [avionics@garmin.com](mailto:avionics@garmin.com). Please call Garmin Aviation Product Support before you send a Maintenance Log to notify them you are sending it to prevent a delay in response. You may download multiple GIA and GSA Maintenance Logs to the same file, however in your email to Garmin you must furnish the order in which they were downloaded (i.e. GIA1, then GIA2, then SRVO PTCH MON, then SRVO PTCH CTL, etc.).

1. Insert a FAT 32 formatted SD card into the top slot of the PFD before turning on the displays.
2. Power up PFD and MFD in the configuration mode.
3. On the PFD in the System page group, use the small FMS knob to scroll to the Diagnostics Terminal page.
4. Press the LG2CRD softkey at the bottom of the PFD. Verify that the softkey text grays out. This indicates the recording function is active and all text that is displayed in the OUTPUT window will be saved to the card.
5. Enable the cursor by pressing the FMS knob, select either “GIA1” or “GIA2” in the LRU drop down menu and then press the ENT key to select it.
6. Servo Fault logs can be retrieved if needed by moving the cursor to the SERVO box and selecting the servo you need to access using the small FMS knob to activate the drop down list and press the ENT key. Be sure to download both the Monitor and Control Logs for that servo.
7. Move the cursor to the COMMAND box and select “View Maintenance Log” in the drop down menu then press the ENT key. The error log data will be displayed in the OUTPUT box. If you see the “more...press any key to continue” text at the bottom of the screen, you may need to reselect “View Maintenance Log” for GIA data to allow it to continue scrolling down the screen (pressing any key will not continue, disregard the text instruction you to do so). Continue to scroll through all the OUTPUT data until you see the text, “End of Fault Log”.
8. Press the LG2CRD softkey to turn off the recording function.
9. Wait 1 minute for the system to save the data from the download to the SD card.
10. While you are waiting for the data to be saved to the SD card, record the order of the LRU’s and/or Servos were downloaded so that you can provide that information to Cessna or Garmin to help decipher the order of the error data.
11. Power down the G1000 System and remove the SD card.
12. Insert SD card in the card reader of a laptop or desktop computer and open the “diag\_buf\_log.txt” file from the SD card using the WordPad program. Verify that all of the fault logs were downloaded by checking for the “End of Fault Log” message at the end of the data.
13. Insert the fault log as an attachment to an email and include the LRU order how the data was downloaded and send to Garmin Aviation Product Support at [avionics@garmin.com](mailto:avionics@garmin.com).

## 5.6 Backup Communications Path Checks

### 5.6.1 Overview

The G1000 system architecture is designed with redundant communication ports for several LRUs so that critical information can continue to be displayed in the event of an equipment or wiring failure. Of most importance is flight attitude, heading, and air data information. The GRS 77 and GDC 74A each have four separate ARINC 429 data lines which are all capable of sending data to the displays. The GEA 71, GTX 33, and GMA 1347 each have two redundant serial communication paths for the same purpose. See Figure 2-7 for a basic G1000 block diagram depicting this architecture. Several other diagrams are shown later in this section for illustrative purposes. When doing troubleshooting always use the Diamond wiring diagrams for reference (Refer to Table 1-2 for wiring diagram drawing numbers).

#### **NOTE**

Refer to Section 5.6.2 and 8.2.4 for procedures on checking the status of each configured G1000 / GFC 700 backup data path.

#### GMA Backup Path Description:

The GMA 1347 utilizes two backup paths to preserve communications with the G1000. The primary data path is from the GMA1 through GIA1 to the PFD. The secondary backup path is through GIA2 into the MFD. Audio panel data is cross-filled to the appropriate display over the HSDB.

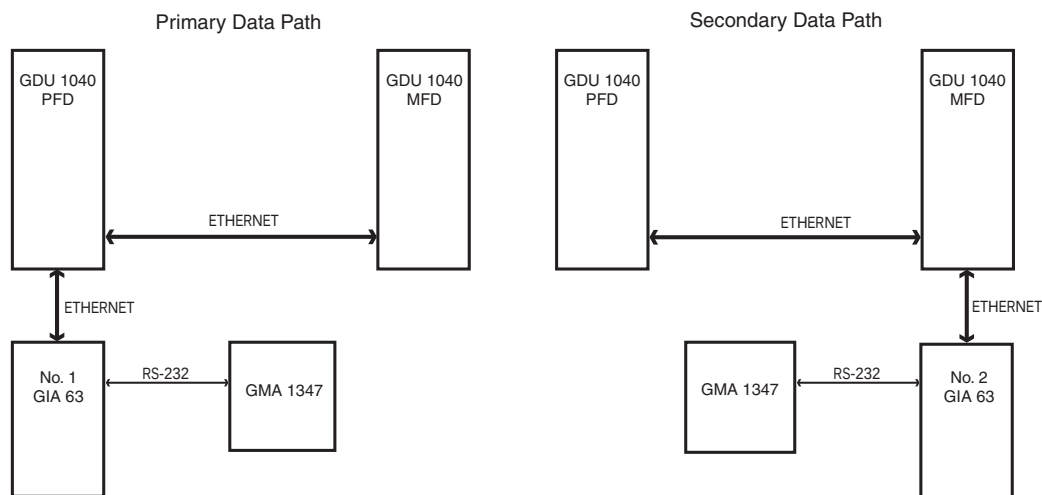


**Figure 5-9. GMA 1347 Data Paths**

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GEA Redundant Path Description:

The GEA 71 Engine/Airframe Unit utilizes two backup paths to preserve communications with the G1000. The primary data path is from the GEA through GIA1 to the PFD, where it is then cross-filled to the MFD. The secondary backup path is through GIA2 into the MFD.

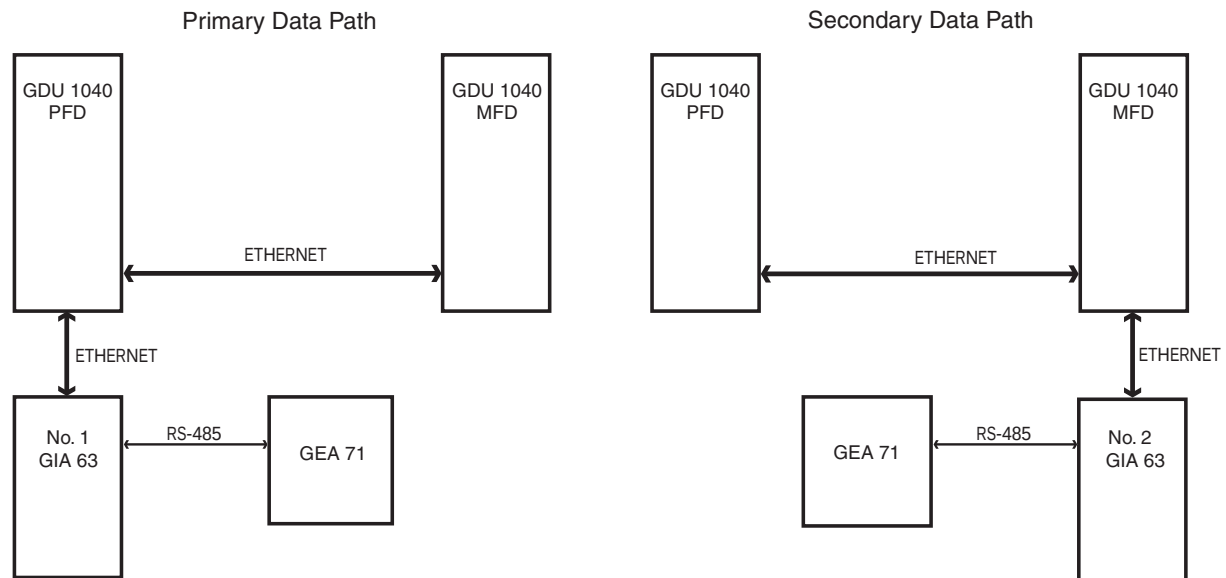


**Figure 5-10. GEA 71 Data Paths**

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*GTX Backup Path Description:*

The GTX 33 transponder utilizes two backup paths to preserve communications with the G1000. The primary data path is from the GTX 33 through GIA1 to the PFD. The secondary backup path is through GIA2 into the MFD. Transponder data is cross-filled to the appropriate display over the HSDB.

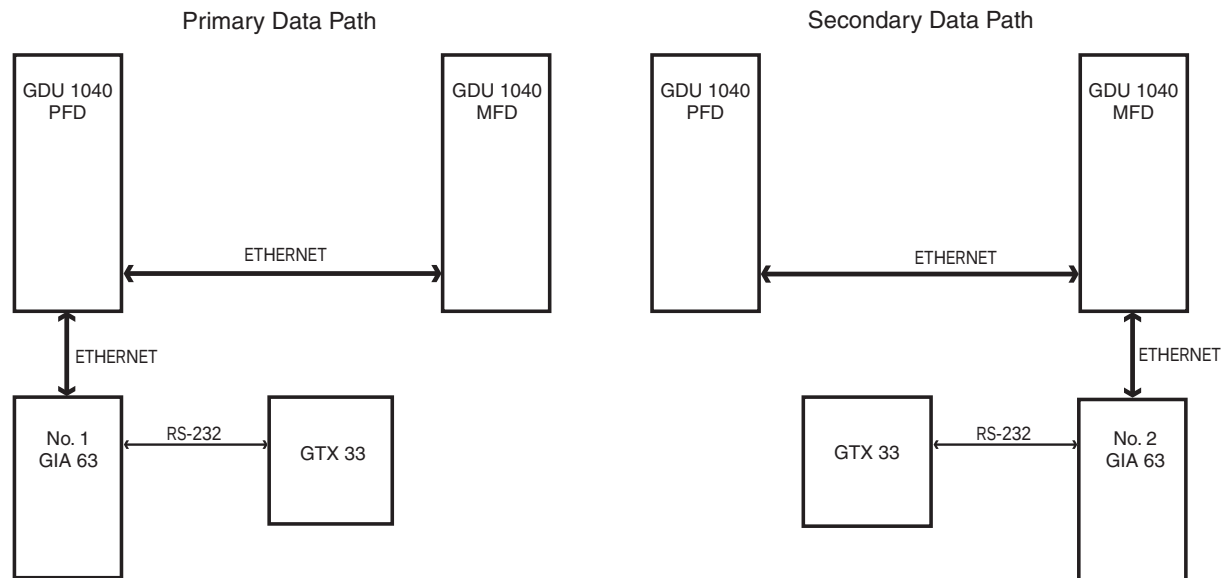


**Figure 5-11. GTX 33 Data Paths**

### GDC 74A Backup Path Description:

The GDC 74A Air Data Computer has 4 redundant communication paths which are capable of supplying ARINC 429 air data information to the PFD and MFD. The primary path is the ARINC 429 bus between the GDC 74A and the PFD. The secondary backup path is the ARINC 429 bus input to the MFD. The tertiary backup path inputs ARINC data to GIA1, where it is then sent over HSDB to the PFD. The last backup path inputs ARINC data to GIA2, where it is then sent over HSDB to the MFD. The air data is then cross-filled to the appropriate display.

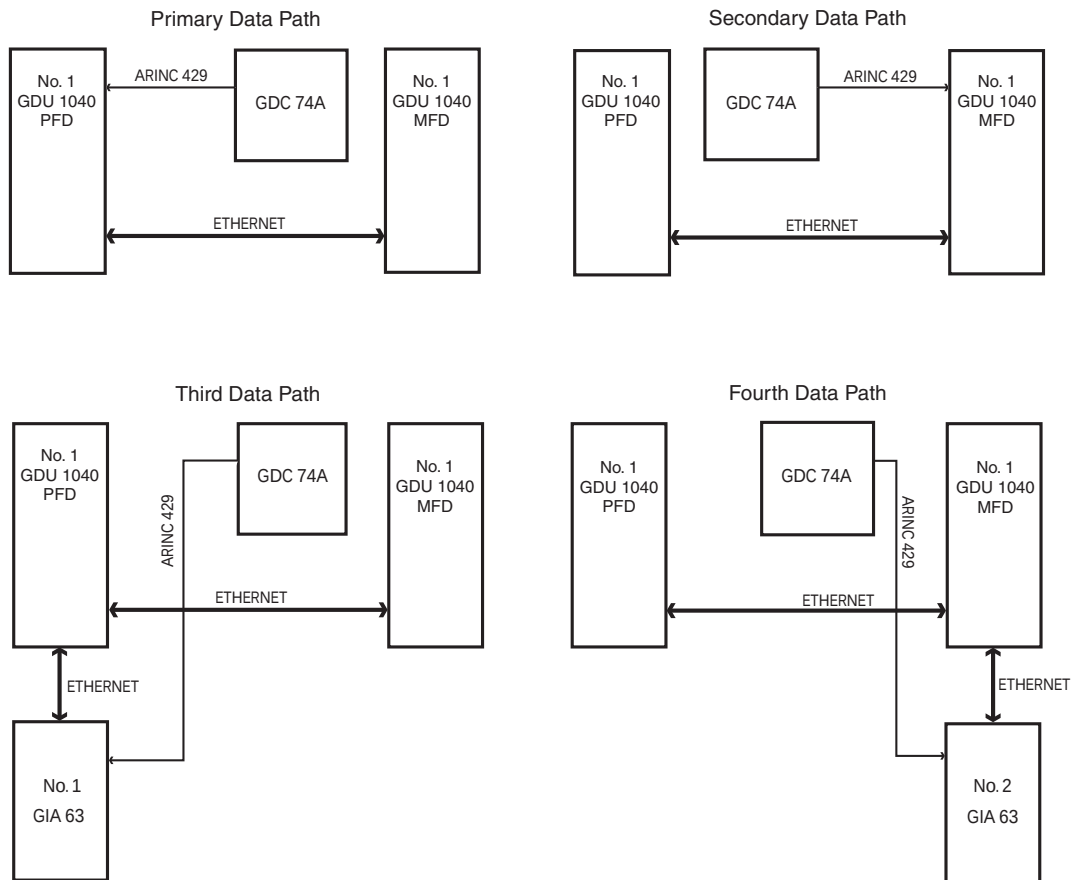


**Figure 5-12. GDC 74A Data Paths**

### GRS 77 Backup Path Description:

The GRS 77 AHRS has 4 redundant communication paths which are capable of supplying ARINC 429 attitude and heading information to the PFD and MFD. The primary path is the ARINC 429 bus between the GRS 77 and the PFD. The secondary backup path is the ARINC 429 bus input to the MFD. The tertiary backup path inputs ARINC data to GIA1, where it is then sent over HSDB to the PFD. The last backup path inputs ARINC data to GIA2, where it is then sent over HSDB to the MFD. AHRS data is then cross-filled to the appropriate display.

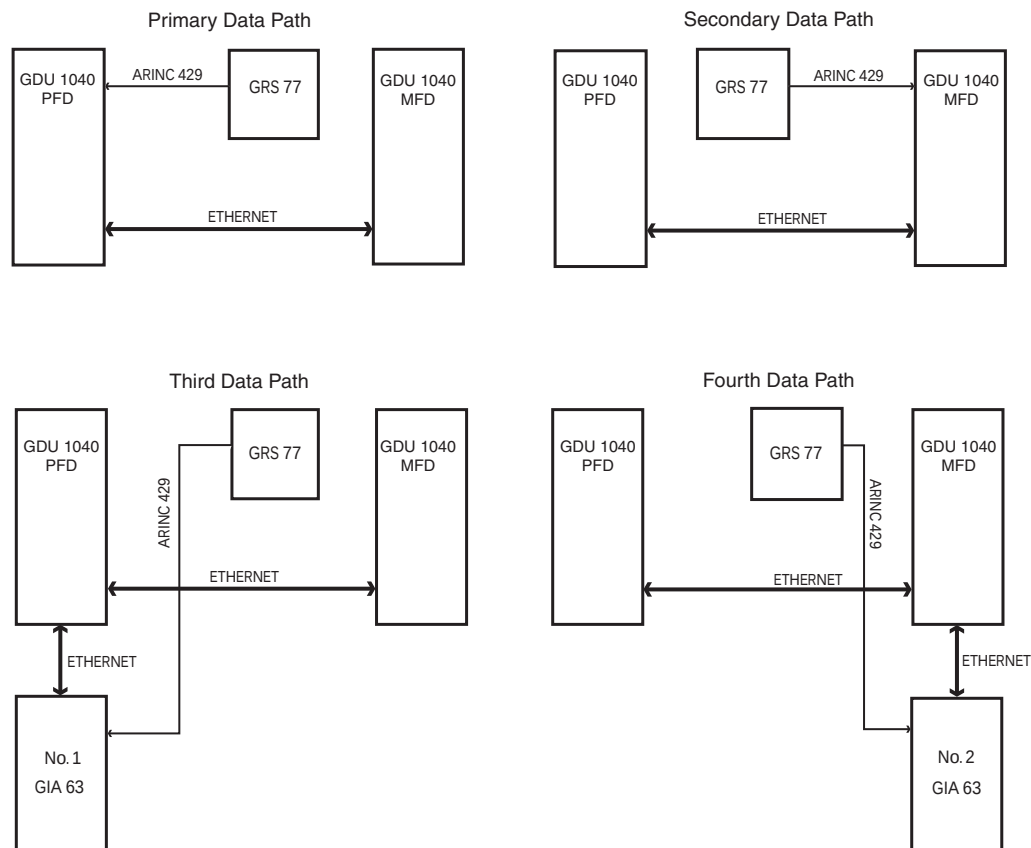


**Figure 5-13. GRS 77 Data Paths**

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## 5.6.2 Data Path Failure Troubleshooting

The following message indicates there is a data path connected to the MFD, PFD or to one of the GIA 63/63Ws that has failed:

**Table 5-15. Data Path Failure Troubleshooting**

| Failure Message                       | Cause                                                                 | Solutions                                                                                                                  |
|---------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| FAILED PATH – A data path has failed. | A communications data path status is not being received by the G1000. | Determine which data path has failed and follow the guidance as applicable to the symptom described later in this section. |

The FAILED PATH message is triggered by a timeout of any one digital channel. These channels are listed on the following configuration mode pages.

GDU Page Group – RS-232 / ARINC 429 CONFIG

GIA Page Group – RS-232 / ARINC 429 CONFIG

GIA Page Group – CAN / RS-485 CONFIGURATION (SW v0321.19 or earlier)

GIA Page Group –RS-485 CONFIGURATION (SW v0321.22 or later)

Examples of these pages and steps showing how to view these pages are shown in Section 8.2.4.

**Important:** Once the FAILED PATH message has been triggered, it will remain on the list of messages until the next power cycle. This latching was implemented so that for intermittent failures, the message would remain at the end of the flight (to alert maintenance crew). Also, this keeps the crew from having to acknowledge message repeatedly in the case of intermittent failures.

### **NOTE**

For GDU software version prior to 7.01, the data path boxes may not be present on the GDU and GIA config pages. Troubleshooting failed path messages will require manually checking the data lines using a continuity tester and may require swapping GDU's, GIA's or other units to determine if the fault lies in the unit or wiring. Garmin recommends following the troubleshooting instructions for the red data boxes or boxes with a red **X** as indicated below to help find the cause of the fault.

The box next to each channel indicates the current status of the channel per the below.

(SW v0321.19 or earlier)

**Red** = data path is known to be failed

**Black** = data path status is unknown

**Green** = data path is known to be good

(SW v0321.22 or later)

**Red X** = data path is known to be failed

**Amber ?** = data path status is unknown

**Green ✓** = data path is known to be good

The applicable data paths can be verified by viewing the configuration mode pages listed in the next section.

## 5.6.2.1 PFD RS-232 / ARINC 429 CONFIG Page

**Table 5-16. PFD1 ARINC 429**

| Channel | LRU       | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IN 1    | GRS 77 #1 |    |    | PFD1/GRS 77 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|         |           |    |    | PFD1/GRS 77 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Configure PFD1.</li> <li>• Configure GRS 77.</li> <li>• Check the PFD1/GRS 77 interconnect wiring for faults.</li> <li>• Swap the PFD with the MFD to confirm if the problem is in the original PFD.               <ul style="list-style-type: none"> <li>○ Replace original PFD if box turns green after swapping displays.</li> <li>○ Replace GRS 77 if problem remains.</li> </ul> </li> </ul>       |
|         |           |    |    | PFD1/GRS 77 data path functionality is unknown. Reload PFD configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| IN 2    | GDC 74 #1 |    |    | PFD1/GDC 74 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|         |           |  |  | PFD1/GDC 74 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure PFD1.</li> <li>• Reconfigure GDC 74A.</li> <li>• Check the PFD1/GDC 74 interconnect wiring for faults.</li> <li>• Swap the PFD with the MFD to confirm if the problem is in the original PFD.               <ul style="list-style-type: none"> <li>○ Replace original PFD if box turns green after swapping displays.</li> <li>○ Replace GDC 74A if problem remains.</li> </ul> </li> </ul> |
|         |           |  |  | PFD1/GDC 74 data path functionality is unknown. Reload PFD configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                       |

## 5.6.2.2 PFD RS-232 / ARINC 429 CONFIG Page

**Table 5-17. MFD1 ARINC 429**

| Channel | LRU       | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IN 1    | GRS 77 #1 |    |    | MFD1/GRS 77 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |           |    |    | MFD1/GRS 77 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure MFD1.</li> <li>• Reconfigure GRS 77.</li> <li>• Check the MFD1/GRS 77 interconnect wiring for faults.</li> <li>• Swap the MFD with the PFD to confirm if the problem is in the original MFD. <ul style="list-style-type: none"> <li>○ Replace original MFD if box turns green after swapping displays.</li> <li>○ Replace GRS 77 if problem remains.</li> </ul> </li> </ul>   |
|         |           |    |    | MFD1/GRS 77 data path functionality is unknown. Reload MFD configuration file.                                                                                                                                                                                                                                                                                                                                                                                                         |
| IN 2    | GDC 74 #1 |    |    | MFD1/GDC 74 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         |           |  |  | MFD1/GDC 74 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure MFD1.</li> <li>• Reconfigure GDC 74A.</li> <li>• Check the MFD1/GDC 74 interconnect wiring for faults.</li> <li>• Swap the MFD with the PFD to confirm if the problem is in the original MFD. <ul style="list-style-type: none"> <li>○ Replace original MFD if box turns green after swapping displays.</li> <li>○ Replace GDC 74A if problem remains.</li> </ul> </li> </ul> |
|         |           |  |  | MFD1/GDC 74 data path functionality is unknown. Reload MFD configuration file.                                                                                                                                                                                                                                                                                                                                                                                                         |

### 5.6.2.3 GIA RS-232 / ARINC 429 CONFIG Page

**Table 5-18. GIA1 RS-232**

| Channel | LRU             | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------|-----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHNL 1  | GDC 74 #1       |    |    | GIA1/GDC 74A #1 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|         |                 |    |    | GIA1/GDC 74A #1 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GDC 74A.</li> <li>• Check the GIA1/GDC 74A interconnect wiring for faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GDC 74A if problem remains.</li> </ul> </li> </ul> |
|         |                 |    |    | GIA1/GDC 74 data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                             |
| CHNL 5  | GTX 33 #1 w/TIS |    |    | GIA1/GTX 33 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|         |                 |  |  | GIA1/GTX 33 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GTX 33.</li> <li>• Check the GIA1/GTX 33 interconnect wiring for faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> </ul> </li> <li>• Replace GTX 33 if problem remains.</li> </ul>        |
|         |                 |  |  | GIA1/GTX 33 data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                             |

**Table 5-20 GIA1 RS-232 (Cont)**

| Channel | LRU         | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHNL 6  | GRS 77 #1   |    |    | GIA1/GRS 77 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|         |             |    |    | GIA1/GRS 77 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GRS 77.</li> <li>• Check the GIA1/GRS 77 interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GRS 77 if problem remains.</li> </ul> </li> </ul>         |
|         |             |    |    | GIA1/GRS 77 data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                              |
| CHNL 7  | GMA 1347 #1 |    |    | GIA1/GMA 1347 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|         |             |  |  | GIA1/GMA 1347 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GMA 1347.</li> <li>• Check the GIA1/GMA 1347 interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GMA 1347 if problem remains.</li> </ul> </li> </ul> |
|         |             |  |  | GIA1/GMA 1347 data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                            |

**Table 5-19. GIA1 ARINC 429**

| Channel | LRU       | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IN 5    | GDC 74 #1 |    |    | GIA1/GDC 74A data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|         |           |    |    | GIA1/GDC 74A data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GDC 74A.</li> <li>• Check the GIA1/GDC 74A interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GDC 74A if problem remains.</li> </ul> </li> </ul> |
|         |           |    |    | GIA1/GDC 74A data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                         |
| IN 6    | GRS 77 #1 |    |    | GIA1/GRS 77 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|         |           |  |  | GIA1/GRS 77 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GRS 77.</li> <li>• Check the GIA1/ GRS 77 interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GRS 77 if problem remains.</li> </ul> </li> </ul>    |
|         |           |  |  | GIA1/GRS 77 data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                          |

**Table 5-20. GIA2 RS-232**

| Channel | LRU                | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------|--------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHNL 5  | GTX 33 #1<br>w/TIS |    |    | GIA2/GTX 33 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|         |                    |    |    | GIA2/GTX 33 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA2.</li> <li>• Reconfigure GTX 33.</li> <li>• Check the GIA2/GTX 33 interconnect for wiring faults</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GTX 33 if problem persists.</li> </ul> </li> </ul>             |
|         |                    |    |    | GIA2/GTX 33 #1 data path functionality is unknown. Reload GIA2 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                               |
| CHNL 7  | GMA 1347<br>#1     |    |    | GIA2/GMA 1347 #1 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|         |                    |  |  | GIA2/GMA 1347 #1 data path is not functioning correctly. <ul style="list-style-type: none"> <li>• Reconfigure GIA2.</li> <li>• Reconfigure GMA 1347.</li> <li>• Check the GIA2/GMA 1347 interconnect wiring for faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GMA 1347 if problem persists.</li> </ul> </li> </ul> |
|         |                    |  |  | GIA1/GMA 1347 data path functionality is unknown. Reload GIA2 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                |

**Table 5-21. GIA2 ARINC 429**

| Channel | LRU       | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IN 5    | GDC 74 #1 |    |    | GIA2/GDC 74 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|         |           |    |    | GIA2/GDC 74 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA2.</li> <li>• Reconfigure GDC 74.</li> <li>• Check the GIA2/GDC 74 interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GDC 74 if problem persists.</li> </ul> </li> </ul> |
|         |           |    |    | GIA2/GDC 74 #1 data path functionality is unknown. Reload GIA2 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                    |
| IN 6    | GRS 77 #1 |    |    | GIA2/GRS 77 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|         |           |  |  | GIA2/GRS 77 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA2.</li> <li>• Reconfigure GRS 77.</li> <li>• Check the GIA2/GRS 77 interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GRS 77 if problem persists.</li> </ul> </li> </ul> |
|         |           |  |  | GIA2/GRS 77 data path functionality is unknown. Reload GIA2 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                       |

## 5.6.2.4 GIA RS-485 CONFIGURATION Page

**Table 5-22. GIA1 RS-485**

| Channel | LRU     | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------|---------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHNL 1  | GEA1    |    |    | GIA1/GEA data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|         |         |    |    | GIA1/GEA data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reconfigure GEA.</li> <li>• Check the GIA1/GEA interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GEA if problem persists.</li> </ul> </li> </ul>                                                                                                                    |
|         |         |    |    | GIA1/GEA data path functionality is unknown. Reload GIA1 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CHNL 4  | GFC 700 |    |    | GIA1/GFC 700 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|         |         |  |  | GIA1/GFC 700 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA1.</li> <li>• Reload GFC 700 Installation configuration files (if equipped).</li> <li>• Check the GIA1/GSA servo interconnects for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Troubleshoot GSA servos to determine which one is causing the problem (ref section 5.5.5).</li> </ul> </li> </ul> |
|         |         |  |  | GIA1/GFC 700 data path functionality is unknown. Reload GFC 700 Installation configuration files (if equipped).                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Table 5-23. GIA2 RS-485**

| Channel | LRU     | Indicator                                                                           |                                                                                     | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------|---------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHNL 1  | GEA1    |    |    | GIA2/GEA data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|         |         |    |    | GIA2/GEA data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA2.</li> <li>• Reconfigure GEA.</li> <li>• Check the GIA2/GEA interconnect for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Replace GEA if problem persists.</li> </ul> </li> </ul>                                                                                                                    |
|         |         |    |    | GIA2/GEA data path functionality is unknown. Reload GIA2 configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CHNL 4  | GFC 700 |    |    | GIA2/GFC 700 data path is functioning correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|         |         |  |  | GIA2/GFC 700 data path is not functioning correctly: <ul style="list-style-type: none"> <li>• Reconfigure GIA2.</li> <li>• Reload GFC 700 Installation configuration files (if equipped).</li> <li>• Check the GIA2/GSA servo interconnects for wiring faults.</li> <li>• Swap the GIA's to confirm if the problem is in the original GIA.               <ul style="list-style-type: none"> <li>○ Replace original GIA if box turns green after swapping units.</li> <li>○ Troubleshoot GSA servos to determine which one is causing the problem (ref section 5.5.5).</li> </ul> </li> </ul> |
|         |         |  |  | GIA2/GFC 700 data path functionality is unknown. Reload GFC 700 Installation configuration files (if equipped).                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## 5.7 GDU 104X Troubleshooting

### 5.7.1 GDU 104X Common Problems

**Table 5-24. GDU 104X Common Problems**

| Symptom                                                     | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display is blank                                            | <p>Cycle power</p> <ul style="list-style-type: none"> <li>✓ If GDU recovers, observe display for yellow text containing error information at the top of the screen. If message indicates software need to be re-loaded, then re-load software. Otherwise, replace the GDU.</li> </ul> <p>Ensure GDU is receiving power. If a circuit breaker is tripped, determine source of short before resetting breaker.</p>                                                                                                                                                                                                                                                                                                                                    |
| Display resets                                              | <p>Ensure circuit breakers have not failed and power wire connections are secure.</p> <p>Use a bright light to verify LCD is active.</p> <ul style="list-style-type: none"> <li>✓ Manually turn up backlight and load configuration files to the PFD and MFD.</li> </ul> <p>Ensure slide lock is fully engaged with the locking tabs on the back of the unit.</p> <ul style="list-style-type: none"> <li>✓ If slide lock is not fully engaged, remove connector and verify the locking tabs on the GDU are perpendicular to the connector. If necessary, straighten them before reseating connector.</li> </ul>                                                                                                                                     |
| Display flickers                                            | <p>Reinstall GDU</p> <p>Switch MFD and PFD</p> <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective display. Please note the position it failed in (PFD or MFD).</li> <li>✓ If problem does not follow unit, troubleshoot aircraft wiring for fault.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SD card is stuck in GDU                                     | <p>DO NOT insert a screwdriver of any length into the card slot.</p> <p>DO NOT pry against the overlay.</p> <p>DO NOT force the SD Card out.</p> <p>Insert a small screwdriver in the groove on the side of the exposed end of the card to pull out the card.</p> <p>Push the card in further to release the card locking mechanism.</p> <p>Check SD Card for having more than one label. Two or more labels on the card will cause sticking.</p> <ul style="list-style-type: none"> <li>✓ Remove all but one label.</li> </ul> <p>Ensure the SD card is from SanDisk. Use of other SD Cards is not recommended.</p> <p>If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair</p> |
| Engine instruments are missing on the MFD                   | <p>Clear user settings on each GDU by pressing and holding the CLR key while powering up both the MFD and PFD.</p> <ul style="list-style-type: none"> <li>✓ If problem persist, replace GDU.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Cannot navigate through pages on the MFD using the FMS knob |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| A button/knob/joystick does not appear to function          | <p>Go to the GDU TEST page in configuration mode and verify button, knob, or joystick is stuck.</p> <ul style="list-style-type: none"> <li>✓ If problem is verified, replace GDU.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

**Table 5-24. GDU 104X Common Problems (Cont)**

| Symptom                            | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Terrain/TOPO Data does not display | <p>Ensure supplemental data cards are inserted correctly in the lower slots of both GDU's.</p> <p>Allow the system to verify the data on the cards for approximately five minutes after power-up.</p> <ul style="list-style-type: none"> <li>✓ If the databases do not activate, reload the Terrain and Obstacle databases onto the SD Card or replace the card.</li> </ul>                          |
| Display will not track photocell   | <p>Go to the GDU TEST page in configuration mode. Cover and uncover the photocell and verify the PHOTOCELL A or PHOTOCELL B value changes.</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective display.</li> </ul>                                                                                                                                                   |
| Keyboard will not track photocell  |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Display will not track dimmer bus  | <p>Check display lighting settings on the Main Lighting page (system group page 3).</p> <p>Check presence or integrity of pin 59 (J10001).</p> <p>Check dimmer bus to verify voltage (refer to the airframe specific maintenance manual for troubleshooting).</p> <p>Switch MFD and PFD:</p> <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective display.</li> </ul> |
| Keyboard will not track dimmer bus |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Display delaminating               | Replace GDU, reference Garmin Service Bulletin 0527.                                                                                                                                                                                                                                                                                                                                                 |

## 5.8 GDU 104X Alerts

### 5.8.1 Software/Configuration Alerts

**Table 5-25. GDU 104X Software/Configuration Alerts**

| Failure Message                                            | Cause                                                                    | Solution                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SW MISMATCH – GDU software version mismatch. Xtalk is off. | The system has found the PFD and MFD software versions do not match.     | Load correct software version. See Section 3.5 for the software loading procedure.                                                                                                                                                                                                                      |
| MANIFEST – PFD1 software mismatch. Communication Halted.   | The system has detected an incorrect software version loaded in the PFD. |                                                                                                                                                                                                                                                                                                         |
| MANIFEST – MFD1 software mismatch. Communication Halted.   | The system has detected an incorrect software version loaded in MFD.     |                                                                                                                                                                                                                                                                                                         |
| CNFG MODULE – PFD1 configuration module is inoperative.    | The PFD configuration module has failed.                                 | <p>Check PFD configuration module connector and wiring for damage inside the GDU connector backshell.</p> <p>Replace PFD configuration module, refer to Section 6.12:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace PFD configuration module wiring and/or pins.</li> </ul> |

**Table 5-25. GDU 104X Software/Configuration Alerts (Cont)**

| Failure Message                                               | Cause                                                                                       | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 CONFIG – MFD1 configuration error. Config service req'd. | A configuration mismatch has occurred between the display and the PFD Configuration Module. | <p>Cycle power 2-3 times.</p> <p>Ensure the MFD/PFD connector is fully seated and locked.</p> <p>Reload system configuration files. See Section 3.5.</p> <p>Press the UPDT CFG softkey on the System Upload page to re-synchronize system ID and other settings with the PFD configuration module.</p> <ul style="list-style-type: none"> <li>✓ If message persists, check configuration module wiring and pins for damage.</li> <li>✓ If no wire or pin damage is found, replace PFD configuration module. See Section 6.12.</li> </ul> <p>If the problem persists, replace the MFD/PFD.</p> |
| PFD1 CONFIG – PFD1 configuration error. Config service req'd. |                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## 5.8.2 Database Alerts

**Table 5-26. Database Alerts**

| Failure Message                                    | Cause                                                                      | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 DB ERR – MFD1 aviation database error exists. | The MFD or PFD has encountered an error in the Jeppesen aviation database. | <p>Attempt to update the aviation database to both displays.</p> <p>If the error persists, replace the MFD or PFD.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| PFD1 DB ERR – PFD1 aviation database error exists. |                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| MFD1 DB ERR – MFD1 basemap database error exists.  | The MFD or PFD has encountered an error in the basemap database.           | <p>Basemaps are stored on internal ROM within the GDU displays. However, basemaps are now included on the 010-00330-42 database cards. For GDU software 7.00 and greater, the G1000 will use the basemap on the card in lieu of the internal when the -42 card is installed.</p> <p>If this message is received, and the -42 card is NOT present, try installing a -42 card in the problematic display and see if the issue goes away.</p> <p>If this message is received and the -42 card IS present, removed the card and verify that the message goes away. If so, then replace the -42 card.</p> <p>If the error persists, Garmin Aviation Technical Support for assistance.</p> |
| PFD1 DB ERR – PFD1 basemap database error exists.  |                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 5-26. Database Alerts (Cont)**

| Failure Message                                                 | Cause                                                                                                                                                       | Solution                                                                                                                                                                                |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 DB ERR – MFD1 terrain database error exists.               | The MFD has encountered an error in the terrain database.                                                                                                   | Confirm database cards are inserted properly.<br>Verify that the card is the SanDisk brand. Use of other brand SD cards is not recommended.<br>Update the database cards and reinstall. |
| PFD1 DB ERR – PFD1 terrain database error exists.               | The PFD has encountered an error in the terrain database.                                                                                                   | If the error persists, replace terrain datacard.<br>If the error persists, replace the MFD or PFD.                                                                                      |
| DB MISMATCH – Aviation database version mismatch. Xtalk is off. | The system has found the Jeppesen aviation database cycles in the PFD and MFD do not match.                                                                 | Load current aviation database versions to both displays.                                                                                                                               |
| DB MISMATCH – Aviation database type mismatch. Xtalk is off.    | The system has found the Jeppesen aviation database types in the PFD and MFD do not match (i.e., different regions: Americas, International, Atlantic, etc) | Load same type aviation database to both displays.                                                                                                                                      |
| DB MISMATCH – Basemap database version mismatch. Xtalk is off.  | The PFD and MFD have different basemap versions installed.                                                                                                  | Replace or update both terrain database cards to install matching databases.<br><br>If the error persists, replace terrain datacard.                                                    |
| DB MISMATCH – Airport Terrain database version mismatch.        | The PFD and MFD have different Airport Terrain database versions installed.                                                                                 |                                                                                                                                                                                         |
| DB MISMATCH – Terrain database version mismatch.                | The PFD and MFD have different terrain database versions installed.                                                                                         |                                                                                                                                                                                         |
| DB MISMATCH – Obstacle database version mismatch.               | The PFD and MFD have different obstacle database versions installed.                                                                                        |                                                                                                                                                                                         |
| DB MISMATCH – Terrain database type mismatch.                   | The PFD and MFD have different terrain database types installed (i.e., different regions: Americas, International, Atlantic, etc).                          |                                                                                                                                                                                         |

### 5.8.3 Cooling Alerts

**Table 5-27. Cooling Alerts**

| Failure Message                                             | Cause                                                 | Solution                                                                                       |
|-------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------|
| MFD1 COOLING – MFD1 has poor cooling. Reducing power usage. | MFD1 has exceeded its operating temperature range.    | Check MFD Fan for proper operation.<br>Replace the MFD.<br>If problem persists contact Garmin. |
| PFD1 COOLING – PFD1 has poor cooling. Reducing power usage. | The PFD has exceeded its operating temperature range. | Check PFD Fan for proper operation.<br>Replace the PFD.<br>If problem persists contact Garmin. |

## 5.8.4 Datacard Alerts

**Table 5-28. Datacard Alerts**

| Message                           | Cause                           | Solutions                                                                                                                                                                                                                                                               |
|-----------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 CARD – data card has failed. | MFD1 cannot read a datacard     | Remove and reinsert datacard multiple times to clean card contacts<br>Replace with known good card to verify failed card <ul style="list-style-type: none"><li>✓ If problem does not persist replace the datacard.</li><li>✓ If problem persists replace MFD.</li></ul> |
| PFD1 CARD – data card has failed. | The PFD cannot read a datacard. | Remove and reinsert datacard multiple times to clean card contacts<br>Replace with known good card to verify failed card <ul style="list-style-type: none"><li>✓ If problem does not persist replace the datacard.</li><li>✓ If problem persists replace PFD.</li></ul> |

## 5.8.5 Key Alerts

**Table 5-29. Key Alerts**

| Failure Message                   | Cause                                                           | Solution                                                                                                                                                                                                    |
|-----------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 “key” KEYSTK – key is stuck. | The system has determined a key is stuck on the listed display. | Go to the GDU TEST page in configuration mode for the appropriate display and verify key is stuck (if key is stuck the corresponding indicator will be green)                                               |
| PFD1 “key” KEYSTK – key is stuck. |                                                                 | Exercise suspected stuck key and reset GDU TEST page to see if indicator remains green without pressing the key. <ul style="list-style-type: none"><li>✓ If problem persists replace the display.</li></ul> |

## 5.8.6 Miscellaneous Alerts

**Table 5-30. Miscellaneous Alerts**

| Failure Message                                               | Cause                                                       | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XTALK ERROR – A flight display cross talk error has occurred. | A communication error has occurred between the MFD and PFD. | <p>Ensure a database error has not occurred</p> <ul style="list-style-type: none"><li>✓ If a database error has occurred, correct error before proceeding.</li></ul> <p>Verify that both PFD and MFD are receiving power.</p> <p>In Configuration Mode, check the System Configuration page:</p> <ul style="list-style-type: none"><li>✓ Ensure that MFD1 and PFD1 are green.</li><li>✓ If configuration is not correct, reconfigure the PFD and MFD per Section 3.5.</li></ul> <p>Check Ethernet interconnect.</p> <p>Replace PFD with a known good unit to verify location of problem:</p> <ul style="list-style-type: none"><li>✓ If problem persists, replace MFD.</li><li>✓ If problem does not persist, replace PFD.</li></ul> |
| DATA LOST – Pilot stored data lost. Recheck settings.         | Pilot stored data has been lost.                            | <p>If the CLR key was held during a power cycle, disregard message.</p> <p>Cycle power to PFD1:</p> <ul style="list-style-type: none"><li>✓ Ensure CLR key is not stuck on the GDU TEST page.</li><li>✓ If problem persist, replace PFD1.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

**Table 5-30. Miscellaneous Alerts (Cont)**

| Failure Message                                            | Cause                                           | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 SERVICE – needs service.<br>Return unit for repair.   | The G1000 has determined MFD1 needs service.    | Ensure the display connector is fully seated and locked.<br><br>If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level.<br><br>Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. <ul style="list-style-type: none"><li>✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises.</li><li>✓ If the CCFT level rises, disregard the message.</li><li>✓ If the CCFT level does not rise, replace the display.</li></ul> Replace the display. |
| PFD1 SERVICE – needs service.<br>Return unit for repair.   | The G1000 has determined the PFD needs service. | ✓                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| PFD1 VOLTAGE – PFD1 has low voltage. Reducing power usage. | The PFD supply voltage is low.                  | Verify aircraft power is at proper voltage level and that the alternator or battery have not failed. Refer to the Diamond AMM for electrical troubleshooting information.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| MFD1 VOLTAGE – MFD1 has low voltage. Reducing power usage. | The MFD supply voltage is low.                  | Ensure the GDU rear connector is properly connected.<br>Check wiring.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## 5.8.7 GMA Common Problems

**Table 5-31. GMA Common Problems**

| Symptom        | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise in Audio | <p>Remove unit and check for MOD 1 marking.</p> <ul style="list-style-type: none"><li>✓ If MOD 1 is not marked, replace GMA.</li></ul> <p>Most often the cause of the noise is external to the GMA. Try the following to locate the source of the noise:</p> <p>Try a different pair of headsets. Noise cancelling headsets may pick up and/or generate more noise than standard headsets from their own circuitry.</p> <p>Check for noise with engine turned off.</p> <ul style="list-style-type: none"><li>✓ If the noise is present only when the engine is running, check the alternator and/or ignition system as possible sources of noise (see applicable airframe specific maintenance manual).</li></ul> <p>Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.)</p> <ul style="list-style-type: none"><li>✓ If the noise is identified from one electrical system or component refer to the applicable airframe specific maintenance manual</li></ul> <p>Ensure the NAV/COM squelch is not open</p> <p>Ensure the ADF and DME audio is not active</p> <p>Ensure the marker beacon audio is not active</p> <p>Ensure the ICS squelch is not open</p> <ul style="list-style-type: none"><li>✓ Master squelch level can be adjusted on the GMA CONFIGURATION page for higher noise environments</li></ul> <p>Replace unit only after all possible external sources of noise are eliminated</p> |

## 5.8.8 GMA Alerts

**Table 5-32. GMA Alerts**

| Failure Message                                               | Cause                                                                     | Solution                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GMA1 SERVICE – GMA1 needs service. Return unit for repair.    | The system has determined that the GMA 1347 needs service.                | Replace GMA 1347.                                                                                                                                                                                                                                                                                                               |
| GMA1 FAIL – GMA1 in inoperative.                              | The system has detected a failure in the GMA 1347.                        | <p>Ensure GMA1 is receiving power</p> <p>Ensure both GIAs are receiving power</p> <p>Ensure all GDUs are receiving power</p> <p>Ensure the GMA/GIA RS-232 data lines are working properly</p> <p>Ensure the GIA/GDU Ethernet data lines are working properly:</p> <ul style="list-style-type: none"><li>✓ Replace GMA</li></ul> |
| MANIFEST – GMA1 software mismatch. Communication Halted.      | The system has detected an incorrect software version loaded in GMA 1347. | See Section 3.5 for the software loading procedure.                                                                                                                                                                                                                                                                             |
| GMA1 CONFIG – GMA1 configuration error. Config service req'd. | The system has detected a GMA 1347 configuration mismatch.                | See Section 3.5 for the configuration loading procedure.                                                                                                                                                                                                                                                                        |

## 5.9 GIA 63 Troubleshooting

### 5.9.1 COM

**Table 5-33. COM Troubleshooting**

| Symptom                 | Recommended Action                                                                                                                                                                                                                                                                     |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weak COM transmit power | Check COM antenna and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):<br>✓ If problem follows unit, replace defective unit per Section 6.3.                              |
| Weak COM receiver       | Check COM antenna and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):<br>✓ If problem follows unit, replace defective unit per Section 6.3.                              |
| No COM sidetone         | Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):<br>✓ If problem follows GIA, replace defective GIA per Section 6.3.<br>✓ If problem persists, replace defective GMA per Section 6.3. |

### 5.9.2 NAV

**Table 5-34. NAV Troubleshooting**

| Symptom           | Recommended Action                                                                                                                                                                                                                                                  |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weak NAV receiver | Check NAV antenna, coupler, and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):<br>✓ If problem follows unit, replace defective unit per Section 6.3. |

### 5.9.3 G/S

**Table 5-35. GS Troubleshooting**

| Symptom           | Recommended Action                                                                                                                                                                                                                                                 |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weak G/S receiver | Check G/S antenna, coupler, and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):<br>✓ If problem follows unit, replace defective unit per Section 6.3 |

### 5.9.4 GPS

**Table 5-36. GPS Troubleshooting**

| Symptom                     | Recommended Action                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Will Not Acquire Satellites | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Check GPS antenna and cabling<br>Check date and time on Date/Time Setup Page<br>✓ If date and time is incorrect, correct date and time.<br>Switch GIA1 and GIA2, to verify location of problem:<br>✓ If problem follows unit, replace defective unit. |

## 5.10 GIA Alert Messages

### 5.10.1 COM Alerts

**Table 5-37. COM Alerts**

| Failure Message                                            | Cause                                                                                     | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COM1 SERVICE – COM1 needs service. Return unit for repair. | The system has determined COM1 needs service.                                             | Replace GIA1 according to instructions in Section 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| COM2 SERVICE – COM2 needs service. Return unit for repair. | The system has determined COM2 needs service.                                             | Replace GIA2 according to instructions in Section 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| COM1 PTT – COM1 push-to-talk key is stuck.                 | The COM1 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state. | <p>Press the push-to-talk switch(s) again to cycle its operation.</p> <p>Check push-to-talk switch(s) and wiring.</p> <p>Check GIA1/GMA 1347 interconnect.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Section 3.5):</p> <ul style="list-style-type: none"><li>✓ If problem follows the unit, replace GIA1.</li><li>✓ If problem persists replace defective GMA 1347.</li></ul>                      |
| COM2 PTT – COM2 push-to-talk key is stuck.                 | The COM2 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state. | <p>Press the push-to-talk switch(s) again to cycle its operation.</p> <p>Check push-to-talk switch(s) and wiring.</p> <p>Check GIA2/GMA 1347 interconnect.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):</p> <ul style="list-style-type: none"><li>✓ If problem follows the unit, replace GIA2.</li><li>✓ If problem persists replace defective GMA 1347.</li></ul>                      |
| COM1 RMT XFR – COM1 remote transfer key is stuck.          | The COM1 external remote transfer switch is stuck in the enabled (or “pressed”) state.    | <p>Press the COM1 external remote transfer switch again to cycle its operation.</p> <p>Check COM1 external remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5)</p> <ul style="list-style-type: none"><li>✓ If problem follows the unit, replace GIA1.</li><li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li></ul> |

**Table 5-37. COM Alerts (Cont)**

| Failure Message                                         | Cause                                                                                                           | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COM2 RMT XFR – COM2 remote transfer key is stuck.       | The COM2 external remote transfer switch is stuck in the enabled (or “pressed”) state.                          | <p>Press the COM2 external remote transfer switch again to cycle its operation.</p> <p>Check COM2 external remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):</p> <ul style="list-style-type: none"> <li>✓ If problem follows the unit, replace GIA2.</li> <li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li> </ul> |
| COM1 TEMP – COM1 over temp. Reducing transmitter power. | The COM transceiver is reporting a high temperature condition and is reducing transmit power to prevent damage. | <p>Check avionics cooling fans for proper operation. Verify that cooling air can flow freely into and out of the remote avionics box.</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace overheating GIA.</li> </ul>                                                                                                                                                                                                                                                             |
| COM2 TEMP – COM2 over temp. Reducing transmitter power. |                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## 5.10.2 NAV Alerts

**Table 5-38. NAV Alerts**

| Failure Message                                            | Cause                                                                                  | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NAV1 SERVICE – NAV1 needs service. Return unit for repair. | The system has detected a failure in NAV1 receiver.                                    | Replace GIA1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NAV2 SERVICE – NAV2 needs service. Return unit for repair. | The system has detected a failure in NAV2 receiver.                                    | Replace GIA2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NAV1 RMT XFR – NAV1 remote transfer key is stuck.          | The NAV1 external remote transfer switch is stuck in the enabled (or “pressed”) state. | <p>Press the NAV1 external remote transfer switch again to cycle its operation.</p> <p>Check NAV1 remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):</p> <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace GIA1.</li> <li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li> </ul> |
| NAV2 RMT XFR – NAV2 remote transfer key is stuck.          | The NAV2 external remote transfer switch is stuck in the enabled (or “pressed”) state. | <p>Press the NAV2 external remote transfer switch again to cycle its operation.</p> <p>Check NAV2 remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.5):</p> <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace GIA1.</li> <li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li> </ul> |

### 5.10.3 Glideslope Alerts

**Table 5-39. Glideslope Alerts**

| Failure Message                                            | Cause                                               | Solution                                                                                                                                            |
|------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| G/S1 SERVICE – G/S1 needs service. Return unit for repair. | The system has detected a failure in G/S1 receiver. | Replace GIA1.                                                                                                                                       |
| G/S2 SERVICE – G/S2 needs service. Return unit for repair. | The system has detected a failure in G/S1 receiver. | Replace GIA2.                                                                                                                                       |
| G/S1 FAIL – G/S1 is inoperative.                           | The system has detected a failure in G/S1 receiver. | Check glideslope antenna and cabling<br>Switch GIA1 and GIA2, to verify location of problem.<br>✓ If problem follows the unit, replace the bad GIA. |
| G/S2 FAIL – G/S2 is inoperative.                           | The system has detected a failure in G/S2 receiver. |                                                                                                                                                     |

### 5.10.4 GPS Alerts

**NOTE**

Before troubleshooting, ensure that no cell phones or devices using cell phone technology are turned on, even in a monitoring state, in the cabin.

**Table 5-40. GPS Alerts**

| Failure Message                                                 | Cause                                                                                               | Solution                                                                                                                                                                                                                   |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GPS1 software mismatch. Communication Halted.        | The system has detected an incorrect software version loaded in GIA1.                               | Load correct software.<br>See Section 3.5 for the Software Loading procedure.                                                                                                                                              |
| MANIFEST – GPS2 software mismatch. Communication Halted.        | The system has detected an incorrect software version loaded in GIA1.                               |                                                                                                                                                                                                                            |
| GPS1 SERVICE – GPS1 needs service. Return unit for repair.      | The system has detected a failure in GPS1 receiver.                                                 | Replace appropriate GIA. Note that for WAAS units, this message may be triggered by a low or defective internal battery (GPS may still be usable).                                                                         |
| GPS2 SERVICE – GPS2 needs service. Return unit for repair.      | The system has detected a failure in GPS2 receiver.                                                 |                                                                                                                                                                                                                            |
| GPS1 FAIL – GPS1 is inoperative.                                | The system has detected a failure in GPS1 receiver.                                                 | Check GPS antenna and cabling for improper wear or signal loss.<br><br>Verify that the correct GIA 63s are installed.<br><br>Check the GIA reporting status in configuration mode.<br><br>Replace GIA if problem persists. |
| GPS2 FAIL – GPS2 is inoperative.                                | The system has detected a failure in GPS2 receiver.                                                 |                                                                                                                                                                                                                            |
| LOI – GPS integrity lost. Crosscheck with other NAVS.           | If the primary receiver is a WAAS sensor, the alert indicates that GPS position data has timed out. |                                                                                                                                                                                                                            |
| GPS NAV LOST – Loss of GPS navigation. Insufficient satellites. | There is no GPS position fix available or the system is in dead reckoning mode.                     |                                                                                                                                                                                                                            |
| GPS NAV LOST – Loss of GPS navigation. Position error.          | The G1000 has detected an internal position warning has occurred.                                   |                                                                                                                                                                                                                            |
| GPS NAV LOST – Loss of GPS navigation. GPS fail.                | The G1000 has detected a GPS engine failure.                                                        |                                                                                                                                                                                                                            |
|                                                                 |                                                                                                     |                                                                                                                                                                                                                            |

## 5.10.5 GIA Cooling Alerts

**Table 5-41. GIA Cooling Alerts**

| Failure Message                          | Cause                                              | Solution                                                                                         |
|------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| GIA1 COOLING – GIA1 temperature too low. | GIA1 operating temperature is too low.             | Allow unit to warm up.                                                                           |
| GIA2 COOLING – GIA2 temperature too low. | GIA2 operating temperature is too low.             | Allow unit to warm up.                                                                           |
| GIA1 COOLING – GIA1 over temperature.    | GIA1 has exceeded its operating temperature range. | Check Avionics Fan for proper operation.<br>Replace GIA1.<br>If problem persists contact Garmin. |
| GIA2 COOLING – GIA2 over temperature.    | GIA2 has exceeded its operating temperature range. | Check Avionics Fan for proper operation.<br>Replace GIA2.<br>If problem persists contact Garmin. |

## 5.10.6 GIA Configuration Alerts

**Table 5-42. GIA Configuration Alerts**

| Failure Message                                                        | Cause                                                                                                                                         | Solution                                                                                                                                                                            |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GIA1 software mismatch. Communication Halted.               | The system has detected an incorrect software version loaded in GIA1.                                                                         | Load correct software. See Section 3.5 for the software loading procedure.                                                                                                          |
| MANIFEST – GIA2 software mismatch. Communication Halted.               | The system has detected an incorrect software version loaded in GIA2.                                                                         |                                                                                                                                                                                     |
| GIA1 CONFIG – GIA1 audio config error. Config service req'd.           | The GIA's audio configuration files are incorrect or missing.                                                                                 | Reload audio configuration files. See Section 3.5 for the configuration loading procedure.                                                                                          |
| GIA2 CONFIG – GIA2 audio config error. Config service req'd.           |                                                                                                                                               |                                                                                                                                                                                     |
| GIA1 CONFIG – GIA1 configuration error. Config service req'd.          | The system has detected a GIA configuration mismatch. If GIAs are not properly configured after being swapped/replaced, this message appears. | Reload GIA configuration files. See Section 3.5 for the configuration loading procedure.                                                                                            |
| GIA2 CONFIG – GIA2 configuration error. Config service req'd.          |                                                                                                                                               |                                                                                                                                                                                     |
| HW MISMATCH – GIA hardware mismatch, GIA1 (or 2) communication halted. | A GIA 63 and a GIA 63W are installed on the same aircraft.                                                                                    | Remove the incorrectly installed GIA. Install the correct P/N GIA and verify correct software is loaded.<br><br>Refer to the appropriate General Arrangement drawings in Table 1-2. |

## 5.11 GEA Troubleshooting

### 5.11.1 GEA Common Problems

**Table 5-43. GEA Common Problems**

| Symptom                                                                     | Recommended Action                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHT, EGT, and TIT are red X'd (no other field is red X'd)                   | Ensure the GEA configuration module and thermocouple wiring and pins are not damaged.<br>Replace the GEA configuration module and thermocouple.                                                                                                                                      |
| One or more CHT, EGT, or TIT temperatures drop as electrical load increases | Check temperature probe(s) for opens (usually where bayonet is cramped)<br>Replace defective temperature probe(s)                                                                                                                                                                    |
| One or more CHT, EGT, or TIT temperatures drift up and flag                 |                                                                                                                                                                                                                                                                                      |
| Fuel quantity flags intermittently                                          | Check for an open in the wiring and connectors between the GEA, signal conditioner, and the sender (hi, low, or signal ground lines)<br>Check for 5 volt excitation shorted to ground between the GEA, signal conditioner, and sender.<br>Check fuel sender for an open or dead spot |
| Engine instruments are missing on the MFD                                   | Clear user data on each GDU by holding down the CLR button while powering on each GDU.                                                                                                                                                                                               |

### 5.11.2 GEA Alerts

**Table 5-44. GEA Alerts**

| Failure Message                                               | Cause                                                                   | Solution                                                                        |
|---------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| MANIFEST – GEA1 software mismatch. Communication Halted.      | The system has detected an incorrect software version loaded in GEA 71. | Load correct software version. See Section 3.5 for the software load procedure. |
| GEA1 CONFIG – GEA1 configuration error. Config service req'd. | The system has detected a GEA 71 configuration mismatch.                | Load GEA configuration file. See Section 3.5 for the configuration procedure.   |

## 5.12 GTX Troubleshooting

### 5.12.1 GTX Alerts

**Table 5-45. GTX Alerts**

| Failure Message                                                 | Cause                                                                   | Solutions                                                                                                                                                 |
|-----------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GTX1 software mismatch. Communication Halted.        | The system has detected an incorrect software version loaded in GTX 33. | Load correct software version. See Section 3.5 for the software load procedure.                                                                           |
| XPDR1 CONFIG – XPDR1 configuration error. Config service req'd. | The system has detected a GTX 33 configuration mismatch.                | Load GTX1 configuration file. See Section 3.5 for the configuration procedure.<br>Verify correct aircraft registration is present in the GTX config page. |

## 5.13 GRS 77/GMU 44 Troubleshooting

### 5.13.1 AHRs Common Problems

#### NOTE

Before troubleshooting, ensure that no cell phones or devices using cell phone technology are turned on, even in a monitoring state, in the cabin.

**Table 5-46. AHRs Common Problems**

| Symptom                               | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AHRs does not complete initialization | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Calibrate the GRS 77<br>Check GRS configuration module wiring for damage<br>Check GRS connector for bent pins <ul style="list-style-type: none"><li>✓ If no damage can be found, replace GRS configuration module</li><li>✓ If problem persists, replace the GRS 77</li></ul>                                                  |
| Attitude appears unstable             | Ensure the four GRS mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify.<br>Ensure mounting rack and airframe shelf are secure and all hardware and brackets are present.<br>Ensure aircraft battery is mounted securely<br>Ensure GRS connector is securely fastened and proper strain relief is provided<br>Remove GRS connector and verify there are no bent pins<br>Contact Garmin for further troubleshooting |

### 5.13.2 GRS Alerts

**Table 5-47. GRS Alerts**

| Failure Message                                              | Cause                                                                                                           | Solutions                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GRS1 software mismatch. Communication Halted.     | The system has detected an incorrect software version loaded in GRS 77.                                         | Reload software and/or manifest using correct approved loader card. See Section 3.5 for the Software Load Procedure.                                                                                                                                          |
| AHRs1 SRVC – AHRs1 magnetic-field model needs update.        | The AHRs magnetic field model should be updated. Appears on ground only.                                        | Load updated magnetic field model. See Section 4.7.                                                                                                                                                                                                           |
| GEO LIMITS – AHRs1 too far North/South, no magnetic compass. | The aircraft is outside of its operating limits; i.e., too far North or South. Heading will be flagged invalid. | Operate the aircraft only within the limits as specified in the G1000/DA 40 AFMS.                                                                                                                                                                             |
| AHRs1 TAS – AHRs1 not receiving airspeed.                    | The GRS 77 is not receiving airspeed from the GDC 74A.                                                          | Check GRS/GDC interconnect<br>Replace the GDC 74A with a known good unit: <ul style="list-style-type: none"><li>✓ If problem does not persist, replace the GRS 77.</li></ul>                                                                                  |
| AHRs1 GPS – AHRs1 not receiving backup GPS information.      | The GRS 77 is not receiving backup GPS information from either GIA 63.                                          | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Check GPS status for GIA 1 and 2 on AUX page 3: <ul style="list-style-type: none"><li>✓ If GPS status is poor check</li></ul> |
| AHRs1 GPS – AHRs1 operating exclusively in no-GPS mode.      | The GRS 77 is operating in the absence of GPS.                                                                  |                                                                                                                                                                                                                                                               |
| AHRs1 GPS – AHRs1 not receiving any GPS information.         | The GRS 77 is not receiving GPS data from the GPS receivers.                                                    |                                                                                                                                                                                                                                                               |

|                                                                   |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AHRS1 GPS – AHRS1 using backup GPS source.                        | The GRS 77 is using the backup GPS data path.        | <p>GPS antenna and cabling.</p> <ul style="list-style-type: none"> <li>✓ If problem persists replace associated GIA.</li> </ul> <p>Check RS-232 configuration settings for the GIA 63/GIA 63Ws:</p> <ul style="list-style-type: none"> <li>✓ If configuration is not correct, reconfigure.</li> </ul> <p>Check GRS/GIA interconnect.</p> <ul style="list-style-type: none"> <li>✓ Replace the GRS 77</li> </ul> |
| MAG VAR WARN – Large magnetic variance. Verify all course angles. | Magnetic variance value from GMU 44 is not accurate. | If problem persists, run magnetic interference check in Section 7.7.2 to check for localized magnetic interference.                                                                                                                                                                                                                                                                                             |

### 5.13.3 GMU Alerts

**Table 5-48. GMU Alerts**

| Failure Message                                          | Cause                                                                      | Solutions                                                                                                                                                        |
|----------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GMU1 software mismatch. Communication Halted. | The system has detected an incorrect software version loaded in GMU 44.    | Load correct software version. See Section 3.5 for the software load procedure.                                                                                  |
| HDG FAULT – AHRS1 magnetometer fault has occurred.       | A fault has occurred in the magnetometer; heading will be flagged invalid. | <p>Check GMU 44/GRS 77 interconnect.</p> <p>Replace the GMU 44.</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace the GRS 77.</li> </ul> |

## 5.14 GDC 74A Troubleshooting

### 5.14.1 Air Data Common Problems

**Table 5-49. Air Data Common Problems**

| Symptom                                      | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Altitude is different than standby altimeter | <p>Perform a pitot/static check per Section 7.6.2 of this manual. Allow the GDC to warm up for fifteen minutes before checking accuracy, per Garmin Service Advisory 0606.</p> <p>Determine which instrument is outside limits and replace. The GDC is not field adjustable. Note: Both units may individually be in spec but show a difference in altitude. Do not return the GDC to Garmin for service if not outside limits.</p> |

### 5.14.2 GDC Alerts

**Table 5-50. GDC Alerts**

| Failure Message                                          | Cause                                                                    | Solutions                                                                       |
|----------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| MANIFEST – GDC1 software mismatch. Communication Halted. | The system has detected an incorrect software version loaded in GDC 74A. | Load correct software version. See Section 3.5 for the software load procedure. |

## 5.15 GDL 69A Troubleshooting

### 5.15.1 GDL 69A Common Problems

**Table 5-51. GDL 69A Common Problems**

| Symptom                                                              | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No XM audio is heard<br>or<br>No XM weather information is displayed | <p>Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable G1000 Pilot's Guide):</p> <ul style="list-style-type: none"><li>✓ Verify the XM volume is not muted on the AUX – XM RADIO page on the MFD.</li><li>✓ Verify no music sources are plugged into the AUX music input jack.</li><li>✓ Verify the COM squelch is not open.</li><li>✓ Verify the ICS squelch is not open.</li><li>✓ Verify the marker beacon tones are not being received.</li><li>✓ Verify the headphone (if equipped) volume is turned up.</li></ul> <p>Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online</p> <ul style="list-style-type: none"><li>✓ If a red X is present, verify the unit is receiving power</li><li>✓ Load GDL configuration files</li><li>✓ If 2.99 or less follow instructions in Garmin Service Advisory 0538 for reactivation.</li><li>✓ If software version is 3.02 or less, see Service Advisory 0613 concerning storm cell limitation that could cause the GDL to stop sending data to the MFD.</li><li>✓ If problem persists, replace the GDL 69/69A</li></ul> <p>Ensure there are no GDL alerts in the alert window</p> <p>Restart the PFD and MFD in configuration mode and go to the GDL page</p> <ul style="list-style-type: none"><li>✓ Verify unit is active</li><li>✓ If unit is not active, contact XM with the Audio Radio ID (or Data Radio ID number for XM weather) number.</li><li>✓ Verify the Signal number is "2" or "3". If it is "0" or "1" check the GDL 69/69A antenna and cabling.</li><li>✓ Reseat the GDL 69/69A to verify the coax connector is fully seated.</li><li>✓ If unit is not active, contact XM Customer service at 1-800-985-9200 to have a refresh signal sent to your unit. You will need to provide them the Audio Radio ID (and Data Radio ID number for XM weather) numbers. Also verify with XM that the correct Weather package (Aviator Lite or Aviator) is on the account, and that no traffic service has been activated against that Radio ID. The unit must be on for approximately one hour after the request for the refresh has been sent to receive the signal.</li><li>✓ Alternatively, you may also go to XM's website at <a href="http://www.xmradio.com/refresh/">http://www.xmradio.com/refresh/</a> and enter the radio ID's to have a refresh signal sent.</li><li>✓ If there is still problems receiving weather products after performing the above step, call XM and have the account deactivated, and a new account activated to clear out any corrupt account information.</li><li>✓ Verify there is a good ground connection through the aircraft between the MFD and the GDL69/69A unit. Reference the Aircraft Maintenance Manual for instructions on how to check bonding and ground points.</li><li>✓ If problem persists, replace the GDL 69/69A.</li></ul> |

## 5.15.2 GDL 69A Alerts

**Table 5-52. GDL 69A Alerts**

| Failure Message                                           | Cause                                                                    | Solutions                                                                                                      |
|-----------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| MANIFEST – GDL software mismatch. Communication Halted.   | The system has detected an incorrect software version loaded in GDL 69A. | Load correct software version. See Section 3.5 for the software load procedure.                                |
| GDL69 CONFIG - GDL 69 config error. Config service req'd. | The system has detected a GDL 69A configuration mismatch.                | Reload configuration. See Section 3.5 for the configuration procedure.                                         |
| GDL69 FAIL - GDL 69 has failed.                           | The system has detected a failure in the GDL 69A.                        | Ensure GDL 69 is receiving power.<br>Check wiring from GDL 69A to MFD.<br>Replace GDL 69A if problem persists. |

## 5.16 GDL 59 Troubleshooting

**Table 5-53. GDL 59 Troubleshooting**

| Symptom                      | Recommended Action                                                                                                                                                                                          |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No communication with GDL 59 | <ul style="list-style-type: none"><li>Check power wiring and pin out of GDL 59 unit.</li><li>Ensure GDL 59 configuration option has been loaded. See Section 3.5 for the configuration procedure.</li></ul> |

### 5.16.1 GDL 59 Alerts

**Table 5-54. GDL 59 Alerts**

| Failure Message                                                   | Cause                                                                                             | Solutions                                                                                                        |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| GDL59 CONFIG<br>GDL 59 config error.<br>Config service req'd.     | The GDL 59 and the GDU have different copies of the GDL 59 configuration.                         | Reload configuration. See Section 3.5 for the configuration procedure.                                           |
| GDL59 FAIL<br>GDL 59 has failed                                   | The GDU is not receiving status data from the GDL 59.                                             | Ensure GDL 59 is receiving power.<br>Check wiring from GDL 59 to GDL 69A.<br>Replace GDL 59 if problem persists. |
| GDL59 SERVICE<br>GDL 59 needs service.<br>Return unit for repair. | The GDL 59 has indicated a failure state.                                                         | Ensure GDL 59 is receiving power.<br>Check wiring from GDL 59 to GDL 69A.<br>Replace GDL 59 if problem persists. |
| GDL59 RTR FAIL<br>GDL 59 router has failed.                       | The GDL 59 has indicated a failure state for it's router.                                         | Ensure GDL 59 is receiving power.<br>Check wiring from GDL 59 to GDL 69A.<br>Replace GDL 59 if problem persists. |
| REGISTER GFDS<br>Data services are inoperative, register w/ GFDS. | The G1XXX is not registered with GFDS or its current registration data has failed authentication. | Verify subscription with Garmin Flight Data Services (reference Section 3.5.14).                                 |

## 5.17 GSR 56 Troubleshooting

**Table 5-55. GSR 56 Troubleshooting**

| Symptom                                                                | Recommended Action                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No communication with GSR 56                                           | <ul style="list-style-type: none"><li>• Check power wiring and pin out of GSR 56 unit.</li><li>• Ensure GSR 56 configuration option has been loaded. See Section 3.5 for the configuration procedure.</li></ul>                                                              |
| No or low-quality Iridium signal                                       | <ul style="list-style-type: none"><li>• Ensure the Iridium antenna has an unobstructed view of satellite constellation.</li><li>• Check the Iridium antenna cable and connectors.</li><li>• Verify antenna ground plane is adequate.</li></ul>                               |
| No audio output<br>(GDL 59/GSR 56 Combination Option Only)             | <ul style="list-style-type: none"><li>• Check wiring from GSR 56 to the GDL 59 for the GDL 59 / GSR 56 Combination option.</li><li>• Verify subscription with Garmin Flight Data Services (reference Section 3.5.14).</li></ul>                                              |
| Unable to make a phone call<br>(GDL 59/GSR 56 Combination Option Only) | <ul style="list-style-type: none"><li>• Verify signal quality is adequate.</li><li>• Check wiring from GSR 56 to the GDL 59 for the GDL 59 / GSR 56 Combination option.</li><li>• Verify subscription with Garmin Flight Data Services (reference Section 3.5.14).</li></ul> |

### 5.17.1 GSR 56 Alerts

**Table 5-56. GSR 56 Alerts**

| Failure Message                                                   | Cause                                                                                                                                                                                            | Solutions                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GSR1 FAIL<br>GSR1 has failed.                                     | <p>The GDL 59 indicated a failure state for GSR56 #1 for the GDL 59 / GSR 56 Combination option.</p> <p>GIA # 2 has indicated a failure state for GSR56 #1 for the Standalone GSR 56 option.</p> | <p>Ensure GDL 59 is receiving power.</p> <p>Check wiring from GSR 56 to the GDL 59 for the GDL 59 / GSR 56 Combination option.</p> <p>Check wiring from GSR 56 to the #2 GIA 63 for the Standalone GSR 56 option.</p> <p>Replace GSR 56 if problem persists.</p> |
| REGISTER GFDS<br>Data services are inoperative, register w/ GFDS. | <p>The G1000 is not registered with GFDS or its current registration data has failed authentication.</p>                                                                                         | <p>Verify subscription with Garmin Flight Data Services (reference Section 3.5.14).</p>                                                                                                                                                                          |

## 5.18 Synthetic Vision and Pathways Troubleshooting

The SVS/Pathways software feature requires the following G1000 sensors/data to be valid:

- AHRS
- Heading
- GPS Position
- 9 Arc-Second Terrain Data

In the event that one the above items fails or is unavailable, the SVS/Pathways feature is automatically removed from the PFD. The following table describes possible symptoms associated with the SVS/Pathways feature, and provides corresponding actions for troubleshooting:

**Table 5-57. SVS Troubleshooting**

| Symptom                                                | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "SYN VIS" softkey does not appear on PFD softkey tier. | Follow the steps in Section 3.5.13 to reactivate the SVS/Pathways feature.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3D terrain presentation does not appear on PFD.        | <p>Verify that P/N 010-00330-43 terrain data cards are installed in the lower slot of the PFD and MFD.</p> <p>Verify that the alert messages shown in Table 5-58 are not displayed on the PFD Alerts Window. If so, follow the solutions described in Table 5-58.</p> <p>Verify that the G1000 AHRS and heading data are valid on the PFD. Verify that a valid GPS 3D position solution is being received. Troubleshoot these systems in accordance with sections 5.9.4 and 5.13.</p> <p>If a terrain database update has just been performed, allow the system time to initialize and verify the data. When the databases have been verified, the current database cycle and version are reported on the MFD AUX – System Status page.</p> |

The following table provides SVS/Pathways specific alert messages which may appear in the Alerts Window on the PFD (press the ALERTS softkey on the PFD to view the Alerts Window):

**Table 5-58. SVS-Related Alert Messages**

| Failure Message                                      | Cause                                                                                        | Solution                                                                                                                                                                                               |
|------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SVS – SVS DISABLED: Out of available terrain region. | SVS is disabled because the aircraft exceeded the boundaries of the loaded terrain database. | Geographical operation limitations are defined in the AFMS listed in Table 1-2. Ensure that operations are within this geographic area.                                                                |
| SVS – SVS DISABLED: Terrain DB resolution too low    | SVS is disabled because a 9 Arc-Second or better database is not currently loaded.           | Ensure the P/N 010-00330-43 Terrain Cards are installed in the lower slot of each display.<br><br>If terrain data has been recently updated, ensure that the correct 9 Arc-Second databases were used. |

## 5.19 ESP Troubleshooting

The Electronic Stability and Protection feature requires the following G1000 sensors/data to be valid:

- Feature Configuration
- AHRS
- Heading
- ADC (IAS)
- GPS Position
- 9 Arc-Second Terrain Data
- GFC 700
- MFD

In the event that one of the above items fails or is unavailable, the ESP feature is automatically degrade or failed. The following table describes possible symptoms associated with the ESP feature, and provides corresponding actions for troubleshooting:

**Table 5-59. ESP Troubleshooting**

| Symptom                                                              | Recommended Action                                                                                                                                                                                            |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ESP Roll Indices not displayed after aircraft is above 200 feet AGL. | <ul style="list-style-type: none"><li>• Ensure that the “ESP Option” has been installed per Section 3.5.6</li><li>• Ensure that the “Enhanced AFCS unlock card” has been loaded per Section 3.5.11.</li></ul> |
| ESP Roll Indices displayed while aircraft is on ground.              | <ul style="list-style-type: none"><li>• Verify that a valid GPS signal is being received by G1000.</li></ul>                                                                                                  |

The following table provides ESP specific alert messages which may appear in the Alerts Window on the PFD (press the ALERTS softkey on the PFD to view the Alerts Window):

**Table 5-60. ESP-Related Alert Messages**

| Failure Message                                      | Cause                                                                                                 | Solution                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ESP FAIL – ESP is inoperative.                       | GFC 700 feature has one or more failures.                                                             | Troubleshoot the GFC 700 AFCS. Refer to Section 5.5.                                                                                                                                                                                                                                                                                                                                                      |
| ESP OFF – ESP selected off.                          | ESP was selected OFF on the MFD AUX-SYSTEM SETUP 2 page.                                              | On the MFD AUX-SYSTEM SETUP 2 page select “Stability & Protection” status to “ENABLED”.                                                                                                                                                                                                                                                                                                                   |
|                                                      | MFD failure.                                                                                          | Ensure MFD is receiving power.<br>Check MFD wiring.<br>Replace MFD if problem persists.                                                                                                                                                                                                                                                                                                                   |
| ESP DEGRADE - ESP IAS mode is inoperative.           | ADC failure.                                                                                          | Ensure ADC is receiving power.<br>Check ADC wiring.<br>Replace ADC if problem persists.                                                                                                                                                                                                                                                                                                                   |
| ESP CONFIG – ESP config error. Config service req'd. | Either the ESP option or Enhanced AFCS Unlock was not performed during the ESP feature configuration. | Ensure that the “ESP Option” has been installed per Section 3.5.6.<br><br>Ensure that the “Enhanced AFCS unlock card” has been loaded per Section 3.5.11.<br><br>If the ESP option needs to be removed, reload the baseline configuration for the specific airframe and all applicable options as described in Section 3.5. Reloading the baseline configuration disables all previously enabled options. |

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## 6 G1000 Equipment Removal & Replacement

This section describes how to remove and replace G1000 equipment in the Diamond DA 40. After removal and replacement, LRUs must be configured and tested as described in Section 7.

### **CAUTION**

When removing and/or replacing any G1000 component, always ensure that aircraft power is off. Unplug any auxiliary power supplies. Before performing maintenance, **it is required** that the technician verify the LRU software part number and version number matches the software configuration listed in the appropriate General Arrangement drawing.

*To check an LRU software part number and/or version:*

1. Start the G1000 system in configuration mode as described in Section 3.3.

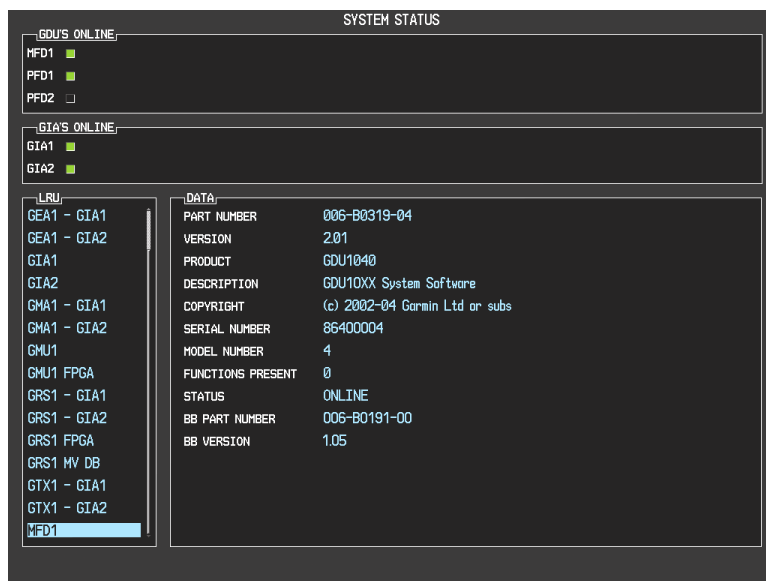


**Figure 6-1. (SW v0321.19 or earlier)  
System Status Page (Configuration Mode)**



**Figure 6-2. (SW v0321.22 or later)  
System Status Page (Configuration Mode)**

- The System Status page shows a list of LRUs in the LRU window. Activate the cursor and use the FMS knob to scroll through the list in the window and select the following items:

**Table 6-1. Equipment Removal and Replacement Software Check**

| <u>LRU</u>                      | <u>SW VER</u> | <u>LRU</u>                    | <u>SW VER</u> |
|---------------------------------|---------------|-------------------------------|---------------|
| ADF 1 <sup>(5)</sup>            | _____         | GPS1                          | _____         |
| COM 1 <sup>(2)</sup>            | _____         | GPS2                          | _____         |
| COM 2 <sup>(2)</sup>            | _____         | GRS1                          | _____         |
| GDC1                            | _____         | GRS1 FPGA                     | _____         |
| GDC1 FPGA                       | _____         | GRS1 MV DB                    | _____         |
| GDL 59 <sup>(6)</sup>           | _____         | GS 1                          | _____         |
| GDL 59 Router <sup>(6)</sup>    | _____         | GS 2                          | _____         |
| GDL 59 Router FS <sup>(6)</sup> | _____         | GSA PTCH CTL <sup>(1)</sup>   | _____         |
| GDL69                           | _____         | GSA PTCH MON <sup>(1)</sup>   | _____         |
| GEA1                            | _____         | GSA PTCH TRM C <sup>(1)</sup> | _____         |
| GFC CERT GIA1 <sup>(1)</sup>    | _____         | GSA PTCH TRM M <sup>(1)</sup> | _____         |
| GFC CERT GIA2 <sup>(1)</sup>    | _____         | GSA ROLL CTL <sup>(1)</sup>   | _____         |
| GFC CERT P C <sup>(1)</sup>     | _____         | GSA ROLL MON <sup>(1)</sup>   | _____         |
| GFC CERT P M <sup>(1)</sup>     | _____         | GSR 1 <sup>(7)</sup>          | None          |
| GFC CERT PT C <sup>(1)</sup>    | _____         | GTX1                          | _____         |
| GFC CERT PT M <sup>(1)</sup>    | _____         | MFD1                          | _____         |
| GFC CERT R C <sup>(1)</sup>     | _____         | MFD1 FPGA                     | _____         |
| GFC CERT R M <sup>(1)</sup>     | _____         | NAV 1 <sup>(3)</sup>          | _____         |

|            |       |                           |       |
|------------|-------|---------------------------|-------|
| GIA1       | _____ | NAV 1 BB <sup>(3)</sup>   | _____ |
| GIA1 AUDIO | _____ | NAV 1 FPGA <sup>(3)</sup> | _____ |
| GIA2       | _____ | NAV 2 <sup>(3)</sup>      | _____ |
| GIA2 AUDIO | _____ | NAV 2 BB <sup>(3)</sup>   | _____ |
| GMA1       | _____ | NAV 2 FPGA <sup>(3)</sup> | _____ |
| GMU1       | _____ | PFD1                      | _____ |
| GMU1 FPGA  | _____ | PFD1 FPGA                 | _____ |

Note 1 - GFC 700-equipped aircraft.

Note 2 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the COM 1 and COM 2 software version is dependent on the hardware and is not field loadable. The software levels may not be the same.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 3 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the NAV 1 and NAV 2, software version is dependent on the hardware and is not field loadable. The software levels may not be the same and NAV 1 BB, NAV 1 FPGA, NAV 2 BB, NAV 2 FPGA will be displayed as UNKNOWN.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 4 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the GS 1 and GS 2 software version is dependent on the hardware and is not field loadable. The software levels may not be the same.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 5 – Aircraft with ADF installed, third party ADF will not report software version and will be displayed as UNKNOWN.

Note 6 – GDL 59 equipped aircraft.

Note 7 – GSR 56 equipped aircraft.

3. The software part number and version is displayed in the DATA window. Compare this to the software configuration in the appropriate General Arrangement drawing (see Table 1-2).

#### **NOTE**

If a faulty LRU is not reporting its software version and part number, check aircraft maintenance logs for last software version loaded and verify against the General Arrangement drawing. The Software Manifest page may also be used to check part numbers and versions.

---

## 6.1 GDU 104X MFD & PFD

### Removal:

1. Using a 3/32<sup>nd</sup> hex tool, rotate all four ¼-turn fasteners counter-clockwise until they reach their stops.
2. Carefully remove the display from the panel.
3. While supporting the display, disconnect the connector.

### Replacement:

1. Visually inspect the connector and pins for signs of damage. Repair any damage. While supporting the display, connect the connector to the rear of the unit.
2. Carefully insert the display into the panel cutout, ensuring that all 4 ¼-turn fasteners align with the corresponding holes.
3. Seat the display in the panel cutout. Do not use excessive force while inserting the display.
4. Once seated, rotate all four ¼-turn fasteners clockwise to lock the display to the panel.
5. Configure and test the MFD and/or PFD according to Section 7.1.

## 6.2 GMA 1347 Audio Panel

### Removal:

1. Using a 3/32<sup>nd</sup> hex tool, turn the hex nut counter-clockwise until the GMA 1347 is unlocked from its location.
2. Carefully remove the GMA 1347 from its rack.

### Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GMA 1347 into the rack until the locking tab engages the rack.
3. Begin to turn the hex nut clockwise. This draws the unit into the rack until seated. Do not over-tighten the nut.
4. Configure and test the GMA 1347 according to Section 7.2.

## 6.3 GIA 63 (W) Integrated Avionics Units

### Removal:

1. Remove the baggage compartment cover to gain access to the remote avionics enclosure.
2. Remove the remote avionics enclosure cover. Removal process is identical for GIA #1 or #2. Remove and replace only one GIA 63 at a time.
3. Unlock the GIA 63 handle by loosening the Phillips screw on the handle.
4. Pull the handle upward to unlock the GIA 63. Gently remove the unit from the rack.

---

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GIA 63 into its rack. The handle should engage the dogleg track.
3. Press down on the GIA 63 hand to lock the unit into the rack.
4. Lock the handle to the GIA 63 body using the Philips screw.
5. Configure and test the GIA 63(s) according to Section 7.3.

## **6.4 GEA 71 Engine/Airframe Unit**

Removal:

1. Gain access to the space behind the instrument panel by removing the panel cover.
2. Unlock the GEA 71 handle by unscrewing the Phillips screw.
3. Firmly grasp the GEA 71 handle and pull it up vertically. This unlocks the unit from the rack.
4. Gently remove the GEA 71 from its rack.

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GEA 71 into the rack. The handle should engage the dogleg track.
3. Press down on the handle to lock the unit into place.
4. Lock the handle to the GEA 71 body using the Philips screw.
5. Configure and test the GEA 71 according to Section 7.4.

## **6.5 GTX 33 Transponder**

### **NOTE**

- Aircraft with GIA 63W P/N 011-01105-00 or 011 01105-01, the unit is mounted in the remote avionics enclosure below the baggage compartment.
- Aircraft with GIA 63W P/N 011-01105-20, the unit is mounted on the outboard side of the remote avionics enclosure below the baggage compartment.

Removal:

1. Remove the baggage compartment floor and compartment to gain access to the remote avionics enclosure.
2. Unlock the GTX 33 handle by loosening the Phillips screw on the handle.
3. Pull the handle upward to unlock the GTX 33. Gently remove the unit from the rack.

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GTX 33 into its rack. The handle should engage the dogleg track.
3. Press down on the GTX 33 hand to lock the unit into the rack.
4. Lock the handle to the GTX 33 body using the Philips screw.
5. Configure and test the GTX 33 according to Section 7.5.

---

### 6.5.1 GDC 74A Air Data Computer

#### Removal:

1. Gain access to the space behind the instrument panel by removing the panel cover.
2. Disconnect the pitot/static plumbing from the rear of the unit. Disconnect the single connector.
3. Loosen each thumbscrew on the hold-down clamp and remove the clamp.
4. Carefully remove the unit from its mount.

#### Replacement:

1. Place the unit in the mounting tray.
2. Position the locking clamp and fasten using the thumbscrews.
3. Connect the pitot/static plumbing.
4. Inspect the connector and pins for damage. Repair any damage. Connect the connector to the unit.
5. Configure and test the GDC 74A according to Section 7.6.

### 6.6 GTP 59 OAT Probe

#### Removal:

1. Remove the co-pilot seat per the DA 40 Aircraft Maintenance Manual.
2. Use a deep-socket to hold the probe in place on the outside of the aircraft. Inside the cockpit, loosen the GTP 59 mounting nut and remove the GTP 59.

#### Replacement:

1. Replacement is the reverse of removal.
2. No configuration is required for the GTP 59. Test according to Section 7.6.5.

### 6.7 GRS 77 AHRS

#### Removal:

1. Remove baggage compartment floor, then remove the baggage compartment.
2. Disconnect the AHRS connector.
3. Remove the four Phillips thumbscrews with a screwdriver and set them aside.
4. Gently lift the GRS 77 from the mounting plate (If the mounting plate is removed, the GRS 77 must be re-calibrated. See Section 7.7).

#### Replacement:

1. Place the GRS 77 on the mounting plate, ensuring the orientation is correct.
2. Fasten the unit to the plate using the Phillips thumbscrews.
3. Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage. Connect the connector to the GRS 77.
4. Calibrate, and test the GRS 77 according to Section 7.7.

---

## 6.8 GMU 44 Magnetometer

### **NOTE**

Do not use a magnetic screwdriver or steel screws to mount the GMU44 or the cover plate.

#### **Removal:**

1. Remove GMU access plate below starboard wing by unscrewing the three Phillips screws.
2. Carefully lower the plate, which contains the GMU 44, a phenolic spacer, and the GMU rack.
3. Disconnect the wiring harness.

#### **Replacement:**

1. Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage. Connect the wiring harness to the GMU 44.
2. Place the GMU in the bay and secure the plate with the 3 Phillips screws.
3. Calibrate and test the GMU 44 according to Section 7.7.

## 6.9 GDL 69A

#### **Removal:**

1. Remove the baggage compartment floor and compartment to gain access to the remote avionics enclosure.
2. Unlock the GDL 69A handle by loosening the Phillips screw on the handle.
3. Pull the handle upward to unlock the GDL 69A. Gently remove the unit from the rack.

#### **Replacement:**

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GDL 69A into its rack. The handle should engage the dogleg track.
3. Press down on the GDL 69A hand to lock the unit into the rack.
4. Lock the handle to the GDL 69A body using the Philips screw.
5. Configure and test the GDL 69A according to Section 7.8.

## 6.10 GSA 81 Servos

#### **Removal:**

1. Gain access to the desired servos by following instructions provided in the Diamond Airplane Maintenance Manual, and by referring to the General Arrangement Drawing.
2. Disconnect the harness connector for each servo.
3. Use a socket or open-wrench to loosen and remove the servo attachment bolts.
4. Carefully remove the servo and place a protective cover on the output gear.

---

Replacement:

1. Inspect the output gear for abnormal wear or the absence of grease. Grease is required whenever the servo motor and servo mount is separated. Refer to Section 4.8 and grease the gear.
2. Carefully place the servo into the servo mount, ensuring proper orientation and alignment. There should be no gap between the servo motor and mount. If there is a gap, slide the motor on the mount until it aligns and falls into place, removing the gap.
3. Fasten the servo to the servo mount using the existing hardware. **DO NOT USE THE HARDWARE TO PULL THE MOTOR AND MOUNT TOGETHER IF THERE IS A GAP!** Doing so will require replacing the servo mount.
4. Inspect the harness connectors and check that no pins are bent or otherwise damaged. Connect the harness and secure it appropriately.
5. If no further maintenance is required, replace the servo access panels and continue to Section 8.3.

## **6.11 GSM 85 & GSM 86 Servo Mounts**

Removal:

1. Remove the desired servo(s) per Section 6.10.
2. De-rig the flight control cabling or chain (Table 1-2 lists the servo installation drawings; refer to these for removal details).
3. Use a socket or open-wrench to loosen and remove the servo attachment bolts.
4. Carefully remove the servo mount.

Replacement:

1. Follow the installation instructions provided in the respective servo installation drawings listed in Table 1-2.
2. If no other maintenance is to be performed, reinstall the servo(s) per Section 6.10.

## **6.12 Configuration Module Removal & Replacement**

Configuration modules (Item 1 shown below) are located in the following LRU harness connector backshells (Item 6): GDU 1040 PFD, GRS 77 AHRS, GDC 74A Air Data Computer, and the GEA 71 Engine/Airframe Unit. Refer to the G1000/DA40 Install Drawing, 005-00304-00, for installation locations.

**NOTE**

If the PFD configuration module is replaced, the G1000 system ID number will change. You will need to replace the Terrain database cards, Feature Unlock Cards (TAWS, SVT, Chartview, Enhanced Search and Rescue, Enhanced AFCS) and update the Jeppesen Navigation database since they will be locked to the old system ID number. Database download accounts with Garmin and Jeppesen will also need to be updated with the new System ID number. If the optional GDL59 and/or GSR56 is installed the GFDS registration will need to be re-accomplished. Contact Garmin for assistance in determining which cards and services are affected.

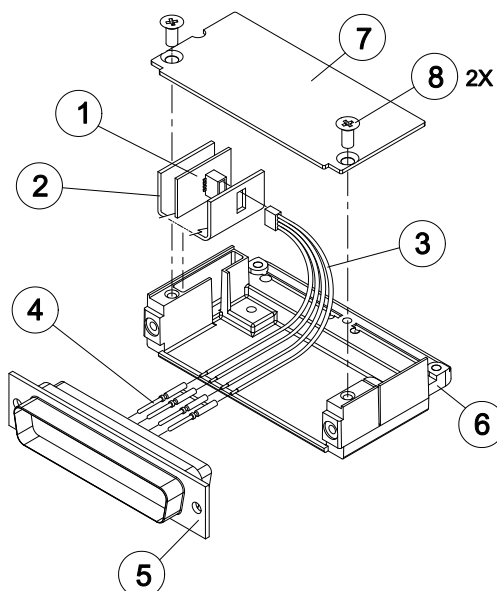


**Figure 6-3. Configuration Module Installation**

**Table 6-2. Configuration Module Kit – 011-00979-00**

| Item | Description                                                    | Qty Needed | Garmin Part Number |                  |
|------|----------------------------------------------------------------|------------|--------------------|------------------|
|      |                                                                |            | 011-00979-00 Kit   | 011-00979-03 Kit |
| 1    | Configuration Module PCB Board Assembly w/EEPROM & Temp Sensor | 1          | 012-00605-00       | 011-02178-00     |
| 2    | Spacer, Config Module                                          | 1          | 213-00043-00       | N/A              |
| 3    | Cable, 4-Conductor Harness                                     | 1          | 325-00122-00       |                  |
| 4    | Pins, #22 AWG (HD)                                             | 5          | 336-00021-00       |                  |

Removal:

**NOTE**

Use ESD protection when handling the configuration module.

1. Disconnect connector from LRU.
2. Remove 2 screws (8) from cover (7) and remove cover.
3. Unplug connector from configuration module (1).
4. Remove configuration module.

Replacement:

1. Inspect connector for damaged pins (4).
2. Place configuration module (1) in position.
3. Insert connector into configuration module (1).
4. Assembly of the connector is the reverse of disassembly.
5. Continue to Section 6.12.1.

---

## 6.12.1 Configuration Module Checkout

### **If the GRS 77 AHRs Configuration Module is replaced:**

All three GRS 77/GMU 44 calibration procedures must be performed. Proceed to Section 7.7.

### **If GDC 74 Configuration Module is replaced:**

Configuration settings must be reloaded to the GDC 74A. Proceed to Section 3.5.5.

### **If GEA 71 Configuration Module is replaced:**

Proceed to Section 7.4.2 and check the EGT / CHT indications for accurate readings.

### **If only the PFD Configuration Module is replaced:**

1. Start the G1000 system in configuration mode.
2. Go to the Configuration Upload Page on the PFD.
3. Press the UPDT CFG softkey and press ENT.

### **If both the PFD and PFD Configuration Module are replaced:**

1. The entire G1000 system must be re-configured. Insert the correct G1000 software loader card into the PFD.
2. Start the G1000 in configuration mode. Go to the System Upload Page on the PFD.
3. See Section 3.5 for instructions on how to use the System Upload page. Check all configuration files and reload them.
4. After reloading configuration files, examine the G1000 installation for any installed configuration options. Options are listed in Section 3.4.3.2. Load optional files as necessary.
5. Continue to Section 8 and conduct the return to service checkout.

### 6.13 GEA 71 Backshell Thermocouple Removal & Replacement

The GEA 71 has a K-Type thermocouple (Item 1 shown below) installed in its backshell, in addition to the configuration module. The thermocouple is used in conjunction with the configuration module temperature sensor to compensate for EGT/CHT temperature probe errors resulting from the dissimilar metals at the pin contacts.

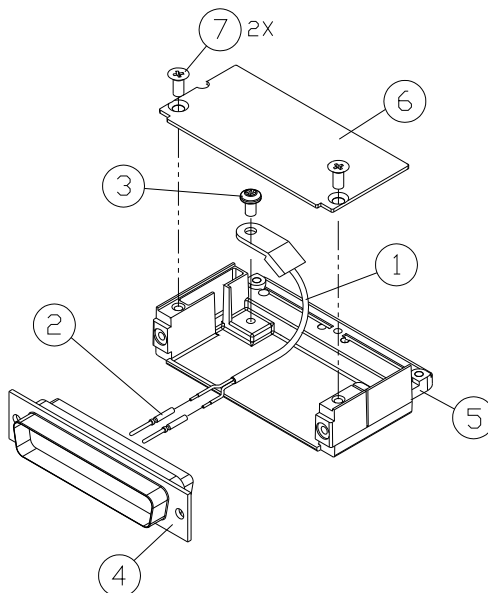


**Figure 6-4. GEA Backshell Thermocouple**

**Table 6-3. Thermocouple Kit (011-00981-00)**

| Item # | Description             | Qty. Needed | Garmin Part Number |
|--------|-------------------------|-------------|--------------------|
| 1      | 3" Thermocouple, K type | 1           | 925-L0000-00       |
| 2      | Pins #22 AWG            | 2           | 336-00021-00       |
| 3      | Screw                   | 1           | 211-60234-08       |

#### Removal

1. Remove GEA 71 per Section 6.4.
2. Remove GEA connector backplate.
3. Remove connector J701, item 5, from the backplate.
4. Remove cover, item 6 from the backshell.
5. Unscrew thermocouple from boss on backshell. Extract the thermocouple pins from the connector.

#### Replacement

1. Crimp pins, item 2, onto each of the thermocouple wires, item 1. Ensure that pre-stripped wire length is 1/8" prior to crimping.
2. Insert newly crimped pins and wires into the appropriate connector housing location, item 4, as specified by the Diamond wiring diagram.
3. Place thermocouple body, item 1, onto the backshell boss, item 5. Place the thermocouple as shown in Figure 6-4 so that the wires exit towards the bottom of the backshell.
4. Fasten thermocouple tightly to backshell using the provided screw, item 3.
5. Fasten cover, item 6, to backshell using the provided screws, item 7.
6. Continue to Section 7.4.2 and verify that the EGT and CHT indications are valid on the MFD.

---

## 6.14 GA35 GPS/WAAS Antennas

Remove and install the GA35 GPS/WAAS antennas following the instructions given on the appropriate installation drawings:

- Install Modification, G1000/KAP140, WAAS, Diamond DA40/40F, drawing 005-00464-00
- Install Modification, G1000/GFC700, WAAS In Diamond DA40/40F, drawing 005-00464-10
- Install Modification, G1000, WAAS, No Autopilot, Diamond DA40/40F, drawing 005-00464-15

### **NOTE**

Prior to the introduction of system software version 0321.23, the GA35 GPS/WAAS antenna installation is captured on the General Arrangement drawings 005-00400-08, 005-00400-10, and 005-00400-15.

For procedural instructions on accessing the GPS antennas, refer to the DA40 Aircraft Maintenance Manual, Chapter 34-58-00, Section 5.

## 6.15 GDL 59 Datalink (Optional)

### **Removal:**

1. Remove the baggage compartment floor and compartment to gain access to the GDL 59.
2. Unlock the GDL 59 handle by loosening the Phillips screw on the handle.
3. Pull the handle upward to unlock the GDL 59. Gently remove the unit from the rack.

### **Replacement:**

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GDL 59 into its rack. The handle should engage the dogleg track.
3. Press down on the GDL 59 lever locking handle to lock the unit into the rack.
4. Lock the handle to the GDL 59 body using the Philips screw.
5. Configure and test the GDL 59 according to Section 7.9.
6. Reinstall the baggage compartment floor and compartment removed to gain access to the GDL 59.

## 6.16 GSR 56 Satellite Transceiver (Optional)

### **Removal:**

1. Remove the baggage compartment floor and compartment to gain access to the GSR 56.
2. Unlock the unit from the rack by loosening the ratcheting latch mechanism.
3. Remove the unit from the rack.

### **Replacement:**

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GSR 56 into its rack.
3. Press down on the GSR 56 lever locking handle to lock the unit into the rack.
4. Lock the unit into the rack by using the ratcheting latch mechanism.

- 
5. Configure and test the GSR 56 according to Section 7.10.
  6. Reinstall the baggage compartment floor and compartment removed to gain access to the GSR 56.

### **6.17 Iridium Antenna (Optional)**

#### Removal:

1. Remove the baggage compartment floor and compartment to gain access to the antenna coaxial cable connector. Refer to the Antenna Install drawing listed in Table 1-2.
2. Disconnect the antenna coaxial cable.
3. Remove the antenna mounting screws.
4. Remove antenna.

#### Reinstallation:

1. Install antenna using retained mounting screws. Refer to the Antenna Install drawing listed in Table 1-2.
2. Connect the antenna coaxial cable.
3. Reinstall the baggage compartment floor and compartment removed to gain access to the antenna.
4. Proceed to Section 7.10 for testing of the GSR 56.

### **6.18 Wi-Fi Antenna (Optional)**

The Wi-Fi antenna, if installed, is a non operational antenna that is available for future expansion of the GDL 59 system.

#### Removal:

1. Remove the baggage compartment floor and compartment to gain access to the antenna coaxial cable connector. Refer to the Antenna Install drawing listed in Table 1-2.
2. Disconnect the antenna coaxial cable.
3. Remove the antenna mounting screws.
4. Remove antenna.

#### Reinstallation:

1. Install antenna using retained mounting screws. Refer to the Antenna Install drawing listed in Table 1-2.
2. Connect the antenna coaxial cable.
3. Reinstall the baggage compartment floor and compartment removed to gain access to the antenna.
4. Proceed to Section 7.9.2 for testing of the GDL 59.

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## 7 G1000 Equipment Configuration & Testing

This section provides procedures to be followed after a unit in the G1000 system is replaced. At the beginning of each LRU section, instructions are given to guide the technician for various removal/replacement scenarios. These instructions define necessary procedures to be followed for situations where original, unchanged units are reinstalled as well as for situations where replacement units are installed.

### **CAUTION**

**DO NOT ALLOW POWER TO BE REMOVED FROM THE G1000 SYSTEM WHEN LOADING SOFTWARE.** Connect a ground power unit to the aircraft for software loading. Do not rely on only the aircraft batteries during the software loading process. Power loss during a software upgrade may cause a LRU to become corrupted and unresponsive requiring replacement. Replacing corrupted units are not covered under warranty. Remove power only when told to do so in the procedure.

### **GENERAL NOTES:**

1. The software loader card must have the correct software version before loading any files into the G1000 system. Loading the files from a previous software version loader card will prevent the system from operating correctly. Verify the software part number on the MFD AUX – SYSTEM STATUS page matches the software part number listed in the “ldr\_part\_nmbr.txt” file on the loader card.
2. All GDU displays should be in the same mode (configuration or normal) for loading software unless instructed differently. If the displays are not in the same mode, the software load may not be successful.
3. Remove Supplemental Database Cards from the lower slot of all displays before loading software into any unit. Not removing the cards may corrupt them during a software upload. Replacing corrupted database cards are not covered under warranty.
4. Garmin recommends the use of SanDisk SD cards for loading software and configuration files. Use of other brand cards is not recommended.
5. Determine what optional equipment (i.e. ADF, DME, GFC700, GDL69A, extended range fuel tanks, etc.) are installed in the aircraft before loading software. Optional equipment configuration files will need to be reloaded after an LRU replacement to re-enable them. Failure to load configuration files for optional equipment will prevent them from working properly.
6. Determine what optional features (i.e. TAWS, Synthetic Vision (SVT), Jeppesen ChartView, etc.) are installed before loading the AIRFRAME configuration file. If the AIRFRAME configuration file is loaded from the system software card, you will need to unlock the optional features using their unlock cards. Failure to load configuration files for optional features will prevent them from working.
7. Pressing the ENT key will check and uncheck the highlighted configuration box.

## NOTE

Verify the presence or non-presence of GIA63W WAAS units to help you choose the correct software to load (see Figure 7-1 and Figure 7-2). Loading WAAS software into a non-WAAS unit or vice-versa may make the unit inoperable. Unit repairs due to loading the wrong software is not covered under warranty.

| SYSTEM STATUS            |                                     |                               |
|--------------------------|-------------------------------------|-------------------------------|
| <b>GDS ONLINE</b>        |                                     |                               |
| MFD1                     | <input checked="" type="checkbox"/> |                               |
| PFD1                     | <input checked="" type="checkbox"/> |                               |
| PFD2                     | <input type="checkbox"/>            |                               |
| <b>GIA/GSDS ONLINE</b>   |                                     |                               |
| GIA1                     | <input checked="" type="checkbox"/> | GSD1 <input type="checkbox"/> |
| GIA2                     | <input checked="" type="checkbox"/> | GSD2 <input type="checkbox"/> |
| <b>OTHER LRUS ONLINE</b> |                                     |                               |
| GDL69                    | <input checked="" type="checkbox"/> |                               |
| GWX                      | <input type="checkbox"/>            |                               |
| <b>LRU</b>               |                                     |                               |
| COM1                     |                                     |                               |
| COM2                     |                                     |                               |
| GDC1                     |                                     |                               |
| GDC1 FPGA                |                                     |                               |
| GDL69                    |                                     |                               |
| GEA1                     |                                     |                               |
| GFC CERT GIA1            |                                     |                               |
| GFC CERT GIA2            |                                     |                               |
| GFC CERT P C             |                                     |                               |
| GFC CERT P W             |                                     |                               |
| <b>DATA</b>              |                                     |                               |
| PART NUMBER              | 006-B0190-42                        |                               |
| VERSION                  | 5.31                                |                               |
| PRODUCT                  | GIA63                               |                               |
| DESCRIPTION              | G1000 GIA 6X SYS                    |                               |
| COPYRIGHT                | (c) 2002-07 Garmin Ltd or subs      |                               |
| SERIAL NUMBER            | 46902495                            |                               |
| MODEL NUMBER             | 2                                   |                               |
| FUNCTIONS PRESENT        | 1                                   |                               |
| STATUS                   | OK                                  |                               |

The PRODUCT line shows the type of GIA63 installed. In this case, a non-WAAS GIA63 is present.

**Figure 7-1. Non-WAAS (GIA 63) System Status Page**

| SYSTEM STATUS            |                                     |                               |
|--------------------------|-------------------------------------|-------------------------------|
| <b>GDS ONLINE</b>        |                                     |                               |
| MFD1                     | <input checked="" type="checkbox"/> |                               |
| PFD1                     | <input checked="" type="checkbox"/> |                               |
| PFD2                     | <input type="checkbox"/>            |                               |
| <b>GIA/GSDS ONLINE</b>   |                                     |                               |
| GIA1                     | <input checked="" type="checkbox"/> | GSD1 <input type="checkbox"/> |
| GIA2                     | <input checked="" type="checkbox"/> | GSD2 <input type="checkbox"/> |
| <b>OTHER LRUS ONLINE</b> |                                     |                               |
| GDL69                    | <input checked="" type="checkbox"/> |                               |
| GWX                      | <input type="checkbox"/>            |                               |
| <b>LRU</b>               |                                     |                               |
| COM1                     |                                     |                               |
| COM2                     |                                     |                               |
| GDC1                     |                                     |                               |
| GDC1 FPGA                |                                     |                               |
| GDL69                    |                                     |                               |
| GEA1                     |                                     |                               |
| GFC CERT GIA1            |                                     |                               |
| GFC CERT GIA2            |                                     |                               |
| GFC CERT P C             |                                     |                               |
| GFC CERT P W             |                                     |                               |
| <b>DATA</b>              |                                     |                               |
| PART NUMBER              | 006-B0544-2A                        |                               |
| VERSION                  | 5.31                                |                               |
| PRODUCT                  | GIA63W                              |                               |
| DESCRIPTION              | G1000 GIA 6XW SYS                   |                               |
| COPYRIGHT                | (c) 2002-08 Garmin Ltd or subs      |                               |
| SERIAL NUMBER            | 68500649                            |                               |
| MODEL NUMBER             | 5                                   |                               |
| FUNCTIONS PRESENT        | 1                                   |                               |
| STATUS                   | OK                                  |                               |

The Product line shows the type of GIA63 installed. In this case, a WAAS unit is installed.

**Figure 7-2. WAAS (GIA 63W) System Status Page**

---

## 7.1 GDU 104X MFD & PFD

### Original Display Reinstalled

If the removed display(s) are re-installed in their original positions, no software or configuration loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process or for displays swapped between aircraft. Continue to the PFD/MFD Test section.

### Original Displays Installed in Opposite Configurations

If the PFD and MFD are installed in opposite positions, no software or configuration loading is required. Continue to the PFD/MFD Test procedure. For GFC 700 aircraft, the displays cannot remain in the swapped positions. The GDU 1042 or 1044 must be installed in the MFD position for the autopilot to operate. Continue to the PFD/MFD Test procedure.

### New Display(s) Installed

If a new, repaired, or exchange GDU is installed; the correct software, configuration and Jeppesen aviation database files must be loaded to the unit. Retain the database SD card(s) from the original display to install in the new display after loading software.

If TAWS, ChartView, ESP, Enhanced SAR and SVS options were previously installed, these must be reactivated. See Sections 3.5.9, 3.5.10, 3.5.11, 3.5.12 and 3.5.13 respectively.

### **CAUTION**

If replacing the PFD with a new, repaired, or exchanged GDU, the new GDU must be placed in the MFD location and the GDU system files loaded there to prevent calibration and other configuration data residing in the PFD config module from being deleted. It is not necessary to install a display in the PFD position to load GDU software into a display installed in the MFD position.

### **NOTE**

Clearing User Settings is required for the initial software installation in a replacement display. It is recommended for successive software loads in the same display, but not required.

## 7.1.1 New PFD Software and Configuration Update

This section applies only to those aircraft that are replacing existing PFD display with a new PFD display unit.

### **STOP!**

PRIOR to applying power to the aircraft, ensure the **existing** PFD display is currently installed in the aircraft.

1. Install the new PFD into the MFD position.
2. Place the correct G1000 software loader card which is applicable for the desired STC configuration in the top card slot (see appropriate GA drawing in Table 1-2).
3. Ensure there is no database cards inserted in the MFD and PFD lower card slots. If there are, remove them until instructed to install them.
4. Turn on the ground power unit.
5. Turn on the BAT side master switch.
6. Turn on the AVIONICS MASTER switch. At this moment, all G1000 equipment should be receiving power.

7. Pull the MFD circuit breaker.
8. While holding the ENT key on the MFD, restore power by closing the MFD circuit breaker.
9. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the MFD, release the ENT key.
10. Press the ENT key to acknowledge the following prompt (NOTE: A softkey labeled YES appears in the lower right corner and may be used in lieu of the ENT key):

**DO YOU WANT TO UPDATE SYSTEM FILES?  
NO WILL BE ASSUMED IN 30 SECONDS.**

11. The following screen is displayed.

**DO YOU WANT TO UPDATE SYSTEM FILES?  
NO WILL BE ASSUMED IN 30 SECONDS.  
UPDATING SYSTEM FILES. PLEASE WAIT.**

12. When complete, the MFD starts in configuration mode displaying the System Status page, perform these additional steps.
  - a. Turn off system power and remove the display from the MFD side and install in the PFD side.
  - b. Reinstall the original MFD.
  - c. Turn on both displays in configuration mode by holding the ENT keys until the words **INITIALIZING SYSTEM** appear.
  - d. Allow the displays to initialize to the SYSTEM STATUS configuration page. This sets the System ID number in the new display and copies the calibration backup files from the PFD configuration module into the PFD.
13. Remove power from aircraft by placing the AVIONICS MASTER and BAT side master switch in the OFF position.
14. Continue to section 3.5.6 to load airframe options, sections 3.5.9 through 3.5.14 to activate the applicable features and to section 3.5.16 to load the applicable splash screen for the aircraft configuration.
15. After the options and features are loaded as necessary continue to the PFD/MFD Testing section.

## 7.1.2 GDU Software Loading

1. Remove the supplemental database cards from the bottom slots of each display. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Place the correct G1000 software loader card which is applicable for the desired STC configuration in the top card slot (see appropriate GA drawing in Table 1-2)
3. While holding the ENT and CLR keys on the display, turn on the display.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the display, release the ENT and CLR keys.
5. Press the ENT key to acknowledge the following prompt:

DO YOU WANT TO CLEAR USER SETTINGS?  
PRESS CLR FOR NO AND ENT FOR YES  
YOU HAVE 10 SECONDS BEFORE YES IS RETURNED

6. Press the YES softkey at 'DO YOU WANT TO UPDATE SYSTEM FILES?' prompt.
7. Confirm update completion and allow the display to initialize to the SYSTEM STATUS configuration page.
8. Continue to section 3.5.6 to load airframe options, sections 3.5.9 through 3.5.14 to activate the applicable features and to section 3.5.16 to load the applicable splash screen for the aircraft configuration.
9. After the options and features are loaded as necessary continue to the PFD/MFD Testing section.

## 7.1.3 PFD/MFD Testing

1. Apply power to the G1000 system and allow displays to initialize for ~1 minute.
2. Check that all COM/NAV display fields are valid in the top corners of the display.

*For PFD:* Check that attitude, heading, altitude, airspeed, vertical speed and OAT fields are valid within 2 minutes of power up.

*For MFD:* Check that the engine instrument fields are valid.



**Figure 7-3. G1000 Normal Mode Check**

3. Push the red DISPLAY BACKUP button on the GMA 1347. Verify both displays enter reversionary mode (both should have valid attitude, heading, altitude, airspeed, vertical speed, and engine instruments):

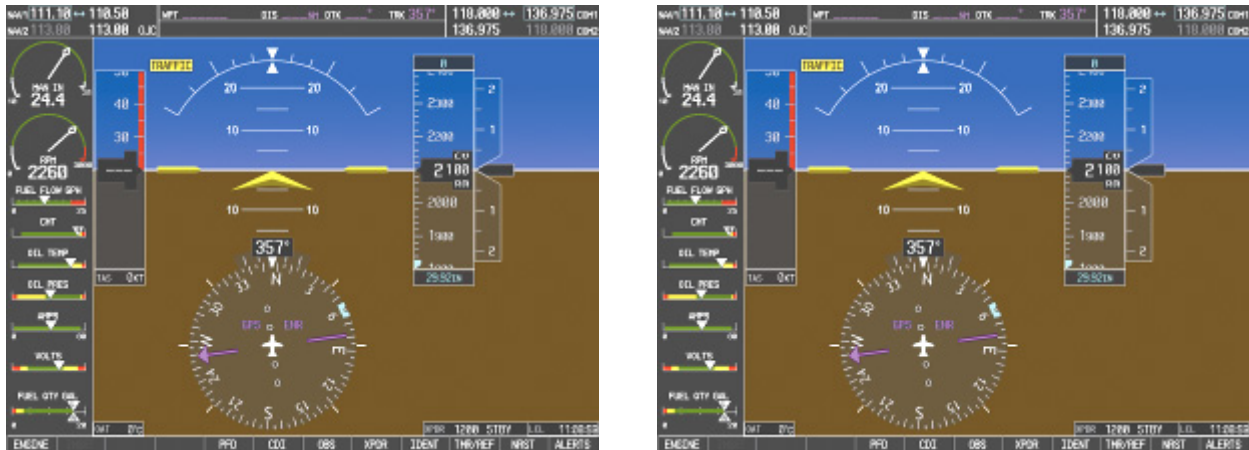


**Figure 7-4. G1000 Reversionary Mode Check**

4. De-activate reversion mode by pushing the red DISPLAY BACKUP button again.
5. Verify optional features are operational (i.e. ADF, DME, ChartView, etc.).
6. If TAWS was activated, select the TAWS page (4th page in the MAP group) on the MFD.



**Figure 7-5. MFD TAWS Page**

- a. Verify that the title at the top of the page reads “MAP – TAWS”. If TAWS has not been enabled, the title will read “MAP – TERRAIN PROXIMITY” or “MAP – TERRAIN”.
  - b. Press the MENU button and select “Test TAWS” from the pop-up menu.
  - c. After the TAWS test has completed, verify that “TAWS System Test Okay” is heard over the cockpit speaker.
7. If no other service is to be performed, perform final return-to-service test as specified in Section 8.

---

## 7.2 GMA 1347 Audio Panel

### Original GMA 1347 Reinstalled

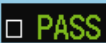
No software/configuration loading or testing is required if the removed GMA 1347 is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.2.2 if the original unit with no repairs was reinstalled. Continue to Section 7.2.2 for repaired or exchanged units.

### New, Repaired or Exchanged GMA 1347 Installed

If a new, repaired, or exchanged GMA 1347 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Continue to the software and configuration loading procedure.

### 7.2.1 GMA Software and Configuration File Loading

If a new, repaired or exchanged GMA 1347 is installed the correct software and configuration files must be loaded. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight the correct airframe model (DA40 or DA40 F) in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate GIA63 model (WAAS or non-WAAS) and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files:
  - GMA – software and configuration files
9. Once the files are selected press the LOAD softkey.
10. When the upload is complete, press the ENT key to select OK in the upload complete window.
11. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
12. After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
13. Continue to the GMA Testing section.

---

### 7.2.2 GMA 1347 Testing

Apply power to the G1000 and allow system to initialize.

On the PFD, open the ALERT window and verify there are no GMA MANIFEST or configuration error messages.

Except for marker beacon operation, an in-aircraft checkout may be performed in the aircraft with known good microphone, headset, and speaker.

#### Intercom System (ICS) Check:

1. Plug in headsets at each ICS position.
2. Ensure that the MAN SQ key is off (no light).
3. Adjust volume for each position and verify that the ICS is working properly.
4. Check Pilot and Copilot ICS positions for isolation and proper operation of volume and squelch controls.
5. Press the PA key. Verify that microphone audio is heard over the speaker when the Push-To-Talk (PTT) key is pressed.

#### Transceiver Operational Check:

Perform a ramp test radio check by exercising the installed transceivers, microphone, microphone key and audio over the headphones and speaker. Verify that communications are clear and PTT operation is correct for each pilot position.

1. Select the audio source corresponding to each installed avionics unit (i.e. NAV1, NAV2, COM1, COM2) and check for audio over the headsets.
2. Press the SPKR key and verify that the selected audio is heard over the speaker.

#### Failsafe Operation Check:

1. Turn the GMA 1347 off by pulling the AUDIO circuit breaker. This directs all COM 1 phone audio, MIC audio and MIC key to the pilot's position.
2. Check the failsafe operation by exercising the COM 1 microphone, microphone key and audio over the headphones. All volume control for the COM audio should be through the PFD/MFD volume control. Verify proper operation of COM 1 using the failsafe operation.
3. Close the AUDIO circuit breaker to continue testing.

---

Marker Beacon Test:

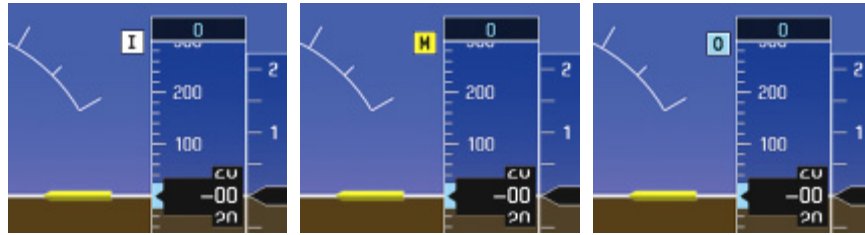


**Figure 7-6. Marker Beacon Symbology**

Using a ramp tester, simulate the outer marker, middle marker and inner marker signals by following the test equipment manufacturer's instructions. Verify that each marker audio signal is present over the headphones and speaker.

Verify that the outer, middle, and inner annunciations appear on the PFD when the corresponding signal is applied. Marker beacon annunciations appear at the upper left corner of the altitude indicator on the PFD (Figure 7-6). Operate the MKR MUTE key on the GMA 1347 and ensure that the audio signal is muted.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

## 7.3 GIA 63 Integrated Avionics Unit

### Original GIA 63(s) Reinstalled:

No software or configuration loading is required if the removed GIA is re-installed in its original position (GIA1 and GIA2 in their original racks). This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.3.2 if the original unit with no repairs was reinstalled. Continue to Section 7.3.1 for repaired or exchanged units.

### Original GIA 63s installed in opposite locations for troubleshooting:

No software loading is required if the originally installed GIA units are re-installed in opposite positions (GIA1 and GIA2 in opposite unit racks). However, the units must be re-configured. Follow these instructions to reconfigure the units without requiring the G1000 system software loader card:

1. With the system turned off, remove the GIA63 units and install in the opposite locations (i.e. GIA1 into the GIA2 slot and vice versa).
2. Apply system power and place both PFD and MFD in Configuration Mode.
3. On the PFD, use the FMS knob to navigate to the GIA RS-232/ARINC 429 CONFIG page.
4. In the SELECT UNIT box in the upper left corner of the screen, verify GIA1 is listed.
5. Press the SET>ACTV softkey in the lower left corner of the screen.

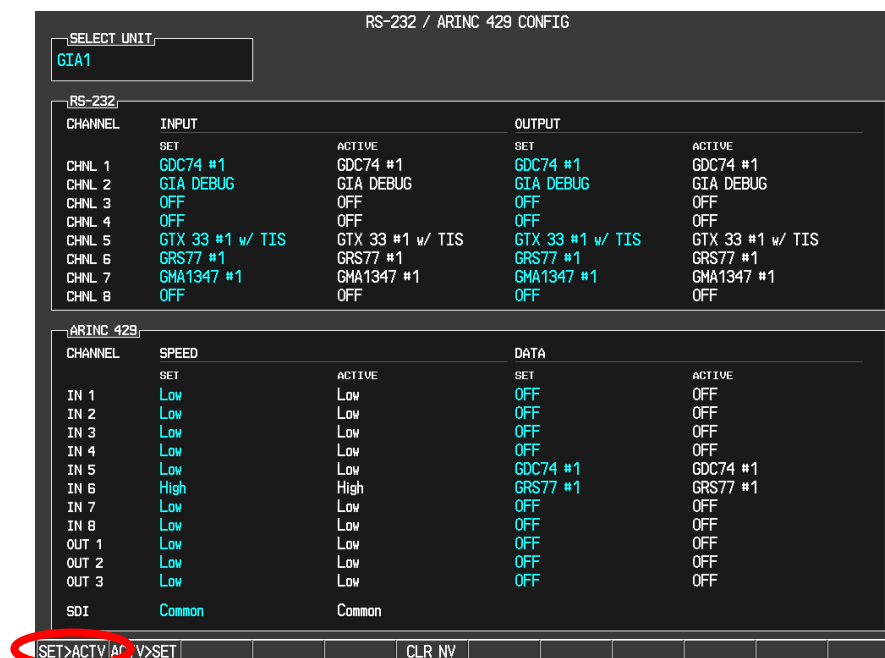


**Figure 7-7. SET>ACTV Softkey**

6. When the “Activate parameter settings?” window appears, verify OK is highlighted and press the ENT key.
7. When the “GIA #1 Configured” window shows “Complete”, press the ENT key to select OK in the window.
8. Activate the cursor, turn the small FMS knob to show the list of GIA choices in the SELECT UNIT field, highlight GIA2 in the pop-up box and press the ENT key.
9. Press the SET>ACTV softkey in the lower left corner of the screen.
10. When the “Activate parameter settings?” window appears, verify OK is highlighted and press the ENT key.

11. When the “GIA #2 Configured” window shows “Complete”, press the ENT key to select OK in the window.
12. Turn off the system.
13. Continue to the GIA 63 Testing Section.

#### New, Repaired, or Exchanged GIA 63(s) Installed

If a new, repaired or exchanged GIA 63 is installed, the correct software and configuration files must be loaded to the unit. Continue to the software and configuration loading procedure.

### **7.3.1 GIA Software and Configuration File Loading**

If a new, repaired or exchanged GIA is installed the correct software and configuration files must be loaded. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight the correct airframe model (DA40 or DA40 F) in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate GIA63 model (WAAS or non-WAAS) and press ENT.

#### **IMPORTANT!**

It is at this step where the choice is given to load WAAS or non-WAAS G1000 software. Be sure to select the correct option. **Loading the wrong software into GIA63/63W units may cause an inoperable condition that is not covered by warranty.** No warning appears if the wrong software is selected. If unsure of which selection to make, turn off the cursor and go back to the SYSTEM STATUS configuration page to check which model of GIA63 unit is installed.

7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files. Some files may have a red INV in place of the software or configuration boxes, this indicates those files do not need to be loaded.
  - GIA (1 or 2) – software and configuration files
  - GPS or WAAS (1 or 2) – software file
  - NAV (1 or 2) – software files
  - COM (1 or 2) – software and configuration files

- AUDIO (1 or 2) – software file
  - AUDIO CFG – configuration file
- Once the files are selected press the LOAD softkey.
  - When the upload is complete, press the ENT key to select OK in the upload complete window.
  - Verify that each column indicates ☒ **PASS** in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
  - Load the optional configuration files for optional equipment (i.e. ADF, DME, GDL59, etc.) that list GIA (1 or 2) files in the PRODUCT window for them. Refer to the LRU to Configuration File Relationship Summary Table in Section 3 to determine which option files need to be loaded for the GIA (1 or 2) replacement based on the installed optional equipment in the aircraft. These must be loaded in order for the optional equipment to function correctly.
  - After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
  - Continue to the GIA 63 Testing section.

### 7.3.2 GIA 63 Testing

Apply power to the G1000 and allow system to initialize.

On the PFD, open the ALERT window and verify there are no GIA MANIFEST or configuration error messages.

#### GPS Signal Acquisition:



**Figure 7-8. AUX – GPS STATUS Page (MFD)**

The GIA 63(W) units should normally acquire a GPS navigation solution within 5 to 10 minutes of startup, provided the aircraft is outside (or indoors with a GPS repeater). Select the GPS STATUS page on the MFD (3<sup>rd</sup> page in AUX group). Two softkeys on the bottom of the display allow the user to toggle between GPS 1 and GPS 2.

---

For non-WAAS G1000 installations:

Verify that both receivers show 3D NAV on the MFD. Verify that the active GPS sensor is GPS1.

For G1000 installations using WAAS:

Verify that both receivers show 3D DIFF NAV on the MFD. Verify that the active GPS sensor is GPS1.

Press the SBAS softkey. Verify that WAAS is checked. When the GIA 63W begins to receive the WAAS correction signals, each of the satellite strength bars should have a 'D' inside of it, indicating that differential corrections are available for that specific satellite.

Continue to the VHF COM Interference test.

VHF COM Interference Test:

This test must be conducted outside. Use of a GPS repeater inside a hangar may result in a failed test. This procedure assumes that the system is currently set to 25 kHz COM channel spacing. Once the signal acquisition test has been completed successfully, perform the following steps:

1. On the MFD, monitor GPS signal strength bars on the AUX – GPS STATUS page.
2. On the PFD, ensure that the CDI is set to GPS. If it is not, press the 'CDI' softkey until GPS ENR is displayed.
3. Verify that the GPS "LOI" flag is out of view.
4. Select 121.150 MHz on the No. 1 COM transceiver.
5. Transmit for a period of 35 seconds while monitoring GPS 1 signal strength levels.
6. During the transmit period, verify that the GPS "LOI" flag does not come into view on the PFD and verify that GPS 1 does not lose a 3-D navigation solution on the MFD.
7. Repeat steps 5 and 6 and re-transmit while monitoring GPS 2 signal levels on the MFD.
8. Repeat steps 4 through 7 for each of the following frequencies:
  - 121.175 MHz
  - 121.200 MHz
  - 131.250 MHz
  - 131.275 MHz
  - 131.300 MHz
9. Repeat steps 4 through 8 for the No. 2 COM transceiver (GIA2).
10. On the MFD, select the AUX – SYSTEM SETUP page.
11. Under the COM CONFIG field, change the COM channel spacing from 25 kHz to 8.33 kHz.
12. Go back to the AUX – GPS STATUS page.
13. Select 121.185 MHz on the No. 1 COM transceiver.
14. Transmit for a period of 35 seconds while monitoring GPS 1 signal strength levels.
15. During the transmit period, verify that the GPS "LOI" flag does not come into view on the PFD and verify that GPS 1 does not lose a 3-D navigation solution on the MFD.
16. Repeat steps 14 and 15 and re-transmit while monitoring GPS 2 signal levels on the MFD.
17. Repeat steps 14 through 16 for each of the following frequencies:

- 121.190 MHz
- 130.285 MHz
- 131.290 Mhz

18. Repeat steps 14 through 17 for the No. 2 COM transceiver (GIA2).

19. On the MFD, select the AUX – SYSTEM SETUP page and change the COM channel spacing back to 25 kHz.

20. Continue to the VOR/LOC/GS Test.

#### VOR/LOC/GS Test:

Check the VOR, ILS, and Glideslope functions with ramp test equipment. Operate the equipment according to the test equipment manufacturer's instructions. Adjust the RF signal to a level adequate to perform the test. Select the appropriate HSI source by using the CDI softkey.

#### **NOTE**

The PFD HSI does not show a course deviation bar unless a valid VHF NAV frequency is tuned.

Simulate a VOR signal on radial 000° with a course-width of 20°. Verify full-scale deflection of the CDI while applying a 10°-deviation signal. Exercise the CDI with both right and left deviations for both NAV 1 and 2 receivers. Repeat using a Localizer signal (tune NAV 1 and NAV2 receivers to appropriate frequency). Exercise the Glideslope deviation indicator with up and down deviation indications.

#### GFC 700 VOR/LOC/GS Test

#### **NOTE**

Perform this test only if the aircraft is equipped with a GFC 700.

1. Simulate a VOR signal on radial 360° with a course-width of 20°. Tune the NAV1 and NAV2 receivers to this specific frequency.
2. Set the HSI on the PFD to NAV1 by pressing the CDI soft key until NAV1 is selected. Adjust the HSI course as necessary using the CRS knob.
3. Verify full scale deflection of the CDI while applying a 10° deviation signal. Exercise the CDI with both right and left deviations for both NAV1 and NAV2.
4. Engage the Autopilot in altitude hold mode and press the NAV key on the MFD. Apply a right signal deviation to the CDI. Verify that the Flight Director and aircraft controls respond and follow the CDI. Apply a left signal deviation and verify the Flight Director and aircraft controls follow the CDI.
5. Press the CDI soft key to select the NAV 2 receiver. Verify that the NAV annunciation flashes yellow, then returns to default PIT mode.
6. Repeat Step 4 while the NAV 2 source is selected on the HSI.
7. Simulate a Localizer/Glideslope signal. Tune this signal on NAV 1 receiver. Set the HSI to LOC1. Use the test equipment to center the deviation bars (localizer and glideslope) on the PFD.
8. Press the APR key on the MFD. Verify that the LOC and GS annunciations are green on the PFD. Apply right/left and up/down localizer/glideslope signals using the test equipment. Verify that the Flight Director and flight controls respond appropriately.
9. Repeat Steps 7 and 8 for the NAV 2 receiver.

#### KAPI40 Alignment

Perform the following procedure only if the following conditions are met:

- 
- a) The KAP 140 autopilot system is installed.
  - b) The #2 GIA 63 or #2GIA 63W is removed and replaced with a different unit.

The KAP 140 (KC 140 computer) autopilot system must be aligned for offsets of the VOR, ILS and GPS inputs. The inputs must be nulled for optimum system performance. The adjustments are stored in the KCM 100 configuration module. For more information on the KAP 140, refer to the Honeywell KAP 140 Installation Manual, Honeywell part number 006-00991-XXXX (the –XXXX defines the revision level of the manual, the most current revision should be used).

If no other service is to be performed, continue to the return-to-service checks in Section 8.

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## 7.4 GEA 71 Engine/Airframe Unit

### Original GEA 71 Reinstalled

No software or configuration loading is required if the removed GEA 71 is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to the GEA 71 test Section 7.4.2 if the original unit with no repairs was reinstalled. Continue to section 7.4.1 for repaired or exchanged units.

### New, Repaired, or Exchanged GEA 71 Installed

If a new, repaired, or exchanged GEA 71 is installed, the correct software and configuration files must be loaded to the unit. Continue to the software and configuration loading procedure.

### 7.4.1 GEA Software and Configuration File Loading

If a new, repaired or exchanged GEA is installed the correct software and configuration files must be loaded. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight the correct airframe model (DA40 or DA40 F) in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate GIA63 model (WAAS or non-WAAS) and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files:
  - GEA – software and configuration files
9. Once the files are selected press the LOAD softkey.
10. When the upload is complete, press the ENT key to select OK in the upload complete window.
11. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
12. Load the optional configuration files for optional equipment (i.e. extended fuel tanks, etc.) that list GEA files in the PRODUCT window for them. Refer to the LRU to Configuration File Relationship Summary Table in Section 3 to determine which option files need to be loaded for the GEA replacement based on the installed optional equipment in the aircraft. These must be loaded in order for the optional equipment to function correctly.
13. After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
14. Continue to the GEA 71 Testing section.

## 7.4.2 GEA 71 Testing

Apply power to the G1000 and allow system to initialize.

On the PFD, open the ALERT window and verify there are no GEA MANIFEST or configuration error messages.

On the MFD, check the indication for each of the sensor or monitor inputs with the aircraft engine off.

In general, verify all engine and system instruments show valid and reasonably true data, with no red Xs or erratic indications.

### Full Page Engine Instrument Check:

1. Observe the EIS strip on the MFD and check each display gauge value against.
2. Press the ENGINE softkey and observe the full-page EIS display. Check each display gauge value against Table 7-1.

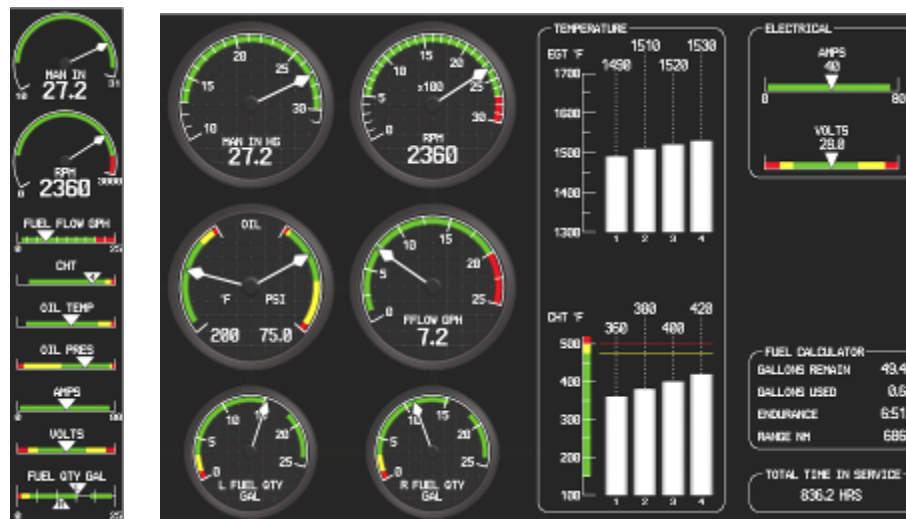


**Figure 7-9. Engine Instrument Pages**

3. Press the RED reversionary mode button on the GMA 1347 audio panel.
4. Press the ENGINE softkey, and then press the LEAN softkey and verify that the display gauges change to show EGT and CHT bar indicators as shown below. Verify information agrees with the conditions of Table 7-1.
5. Press the SYSTEM softkey and verify that the display changes to show the digital equivalent of the normal EIS page (oil temp, oil pressure, etc), as shown below. Verify the information presented agrees with the conditions of Table 7-1.

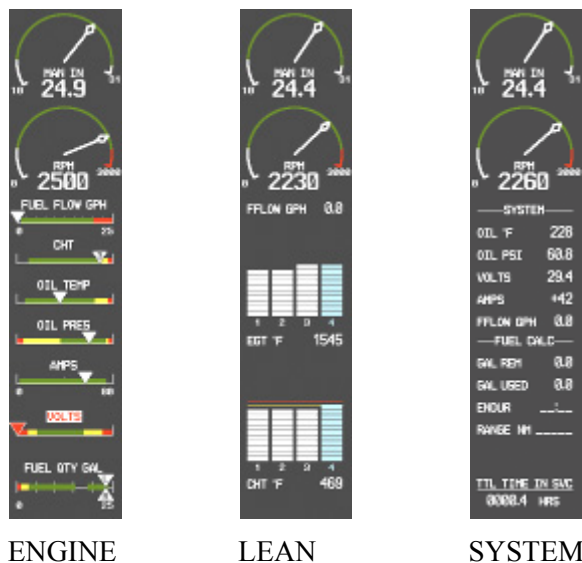


**Figure 7-10. Engine Instrument Sub Pages**

6. Deactivate reversionary mode.

**Table 7-1: Engine/Airframe Instrument Checks**

| Engine/Airframe Indicator          | Desired Reading                                                   |
|------------------------------------|-------------------------------------------------------------------|
| Manifold Air Pressure (DA 40 Only) | Atmosphere Pressure                                               |
| Tachometer                         | 0                                                                 |
| Fuel Flow                          | 0                                                                 |
| CHT                                | Ambient*                                                          |
| EGT                                | Ambient*                                                          |
| Oil Temperature                    | Ambient*                                                          |
| Oil Pressure                       | Approximately 0                                                   |
| Amps                               | Approximately 0                                                   |
| Volts                              | Battery or GPU Voltage, Approximately 28 Vdc                      |
| Fuel Tanks                         | FULL w/ full tanks, (including extended range tanks, if equipped) |
| Total Time in Service              | Total Airborne Time                                               |

\*Unless engine is hot, in which case higher temps to be expected.

7. If no other service is to be performed, continue to the return-to-service checks in Section 8.

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## 7.5 GTX 33 Transponder

### Original GTX 33 is Reinstalled

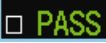
No software or configuration loading is required if the removed GTX 33 is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.5.3 if the original unit with no repairs was reinstalled. Continue to Section 7.5.1 for repaired or exchanged units.

### New, Repaired, or Exchanged GTX 33 is Installed

If a new, repaired, or exchanged GTX 33 is installed, the correct software and configuration files must be loaded to the unit. Continue to the software and configuration loading procedure.

### 7.5.1 GTX Software and Configuration File Loading

If a new, repaired or exchanged GTX is installed the correct software and configuration files must be loaded. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight the correct airframe model (DA40 or DA40 F) in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to activate the drop-down menu. Move the cursor to highlight the appropriate GIA63 model (WAAS or non-WAAS) and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files:
  - GTX – software and configuration files
9. Once the files are selected press the LOAD softkey.
10. When the upload is complete, press the ENT key to select OK in the upload complete window.
11. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
12. After the software and configuration files are loaded, continue to the transponder configuration page setup section.

## 7.5.2 Transponder Configuration Page Setup

Change only the fields listed in the procedure below. Changing other fields could result in an inoperable transponder.

|                 | SET          | ACTIVE       |
|-----------------|--------------|--------------|
| ADDRESS TYPE    | US TAIL      | US TAIL      |
| ADDRESS         | N58GA        | N58GA        |
| FLIGHT ID TYPE  | SAME AS TAIL | SAME AS TAIL |
| FLIGHT ID       | N58GA        | N58GA        |
| AIRCRAFT WEIGHT | < 15,500 LBS | < 15,500 LBS |
| MAX AIRSPEED    | <= 150 KTS   | <= 150 KTS   |
| VFR CODE        | 1200         | 1200         |

**Figure 7-11. GTX Configuration Page**

1. On the PFD, select the GTX page group, then select the Transponder Configuration page.
2. Press the FMS knob to activate the cursor and enter the VFR code in the SET column if missing or incorrect using the FMS knobs. Press the ENT key when finished entering the code to save it.
3. Move the cursor to the ADDRESS TYPE field and select US TAIL for FAA N# registered aircraft, or HEX ID for non FAA registered aircraft. Press the ENT key after highlighting the desired type to select it.
4. Move the cursor to the MODE S ADDRESS field and enter the N# or HEX ID number. Press the ENT key when finished entering the code to save it.
5. Move the cursor to the FLIGHT ID TYPE field and select SAME AS TAIL (N# registrations), CONFIG ENTRY (HEX ID registrations) or PFD ENTRY (so the pilot can change it). Press the ENT key to save the selection.
6. Move the cursor to the FLIGHT ID field if desired to enter a default Flight ID number. Press the ENT key when finished entering the code to save it.
7. Press the FMS knob to de-activate the cursor.
8. Turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
9. Continue to the GTX 33 Testing procedure.

## 7.5.3 GTX 33 Testing

Apply power to the G1000 and allow system to initialize.

On the PFD, open the ALERT window and verify there are no GTX MANIFEST or configuration error messages.

---

Operation of the GTX 33 Mode-S transponder is accomplished using the G1000 PFD. Refer to Garmin part number 190-00324-01, G1000 Cockpit Reference Guide for Diamond DA40, for basic operation. Perform a basic operational check on the transponder.

The integrated transponder/altitude reporting system must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) §§ 91.411 and 91.413, **every 24 calendar months**, or any time the transponder is removed. This test requires the use of an L-band multifunction test set. Specific instructions for operating the ramp tester are contained in the applicable operator's manual. Refer to Title 14 CFR Part 43 Appendix F for testing criteria.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

## **7.6 GDC 74A Air Data Computer**

### Original GDC 74A is Reinstalled

No software or configuration loading is required if the removed GDC 74A is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.6.2 if the original unit with no repairs was reinstalled. Continue to section 7.6.1 for repaired or exchanged units.

### New, Repaired, or Exchanged GDC 74A is Installed

If a new, repaired, or exchanged GDC 74A is installed, the correct software and configuration files must be loaded to the unit. Continue to the software and configuration loading procedure.

### **7.6.1 GDC Software and Configuration File Loading**

If a new, repaired or exchanged GDC 74 is installed the correct software and configuration files must be loaded. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight the correct airframe model (DA40 or DA40 F) in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate GIA63 model (WAAS or non-WAAS) and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files:
  - GDC – software and configuration files
9. Once the files are selected press the LOAD softkey.
10. When the upload is complete, press the ENT key to select OK in the upload complete window.
11. Verify that each column indicates  **PASS** in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.

- 
12. After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
  13. Continue to the GDC 74A Testing section.

## 7.6.2 GDC 74A Testing

Apply power to the G1000 and allow system to initialize.

### **IMPORTANT!**

**Allow unit to warm up for 15 minutes before performing the following tests.**

On the PFD, open the ALERT window and verify there are no GDC MANIFEST or configuration error messages.

Verification of the altimeter and airspeed must be performed using a pitot/static ramp tester. The static port and altimeter must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) § 91.411 and Part 43 Appendix E, *every 24 calendar months*.

For system software 0321.17 or later, the G1000 pitot/static system may be tested in normal display mode.

To properly conduct these tests on G1000 systems equipped with System Software Version 0369.13 or earlier, perform the following procedure:

*To prepare the G1000 System for Part 43 Appendix E testing (0369.13 or earlier only):*

1. Remove power to the PFD by pulling the circuit breaker labeled PFD.
2. Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
3. Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
4. Rotate the FMS knob to until the display shows the GRS page group. Within the Air Data 1 sub window is the field "B ALT" which is Barometric Altitude. B ALT is equivalent to the altitude that will be displayed to the pilot on the altitude display when the PFD is in normal mode. B ALT will be used for all CFR Part 43 Appendix E tests for G1000 altitude.
5. Push the red "display backup" button on the audio panel. This will activate Reversionary Mode for the MFD. Baro settings can then be read from the MFD for the CFR Part 43 Appendix E tests.
6. After completing the tests specified by § 91.411 and Part 43 Appendix E, return the MFD to normal mode by pushing the red "display backup" button. Return the PFD to normal mode by pulling the PFD circuit breaker and then resetting.

### **NOTE**

The following tests are above and beyond the requirements set forth in Appendix E.

---

### 7.6.3 Airspeed Test

1. Command air data test set (ADTS) to simulate air speeds shown in the table below.
2. Wait for ADTS to report that target values have been achieved.
3. Verify that computed air speeds shown on the PFD are within the tolerances specified in the table below:

**Table 7-2. Airspeed Test**

| Calibrated air speed, knots | Allowed tolerance, ±knots |
|-----------------------------|---------------------------|
| 50                          | 5.0                       |
| 80                          | 3.5                       |
| 100                         | 2.0                       |
| 120                         | 2.0                       |
| 150                         | 2.0                       |

For EASA Registered Aircraft Only—EASA Airspeed Tape configuration must be completed prior to performing this procedure.

4. Command air data test set (ADTS) to simulate 68 KIAS on the Airspeed Indicator.
5. Verify that the color bands on the airspeed tape match those specified in the table below:

**Table 7-3. EASA Airspeed Tape Test**

| Color Bands on Airspeed Indicator | Indicated airspeed range |
|-----------------------------------|--------------------------|
| Red                               | Up to 49 KIAS            |
| White                             | 49 – 52 KIAS             |
| White/Green                       | 52 – 91 KIAS             |

6. There should be no Yellow band between the Red and the White/Green bands (Reference image below).



**Figure 7-12. EASA Airspeed Tape**

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### 7.6.4 Static Port Vertical Speed (Rate of Climb) Test

1. Command ADTS to change the altitude at the rates shown in the table below.
2. Wait for ADTS to report that target rates have been achieved.
3. Verify that the Rate of Climb reported by the Vertical Speed field on the PFD is within the tolerances specified in the table below:

**Table 7-4. Vertical Speed Test Tolerances**

| Vertical Speed, feet/minute | Allowed tolerance, $\pm$ feet/minute |
|-----------------------------|--------------------------------------|
| 2000                        | 100                                  |
| 1000                        | 50                                   |
| 500                         | 45                                   |
| 200                         | 45                                   |
| 0                           | 45                                   |
| -200                        | 45                                   |
| -500                        | 45                                   |
| -1000                       | 50                                   |
| -2000                       | 100                                  |

### 7.6.5 OAT Probe Check

Check the outside air temperature (OAT) measurement shown on the PFD to ensure it reads ambient temperature, within  $\pm 2.0$  degrees (reference a second thermometer for ambient temperature comparison).

If no other service is to be performed, continue to the return-to-service checks in Section 8.

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## 7.7 GRS 77 AHRS / GMU 44 Magnetometer

### Original GRS 77 is Reinstalled

If the original GRS 77 was reinstalled, then no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.7.2 if the original unit with no repairs was reinstalled. Continue to Section 7.7.1 for repaired or exchanged units.

### New, Repaired, or Exchanged GRS 77 is Installed

If a new, repaired, or exchanged GRS 77 is installed, install software files. Continue to the software loading procedure.

### Original GMU 44 is Reinstalled

If the original GMU 44 was reinstalled, then no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.7.2 if the original unit with no repairs was reinstalled. Continue to section 7.7.1 for repaired or exchanged units.

### New, Repaired, or Exchanged GMU 44 is Installed

If a new, repaired, or exchanged GMU 44 is installed, install software files. Continue to the software loading procedure.

### 7.7.1 GRS and GMU Software File Loading

If a new, repaired or exchanged GRS or GMU is installed the correct software files must be loaded. These units do not have a configuration file to load. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight the correct airframe model (DA40 or DA40 F) in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate GIA63 model (WAAS or non-WAAS) and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following file for the unit replaced:
  - GRS – software file
  - GMU – software file
9. Once the files are selected press the LOAD softkey.
10. When the upload is complete, press the ENT key to select OK in the upload complete window.

11. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
12. After the software files are loaded, continue to the GRS/GMU Calibration Procedures section.

## 7.7.2 GRS/GMU Calibration Procedures

Table 7-5 provides a recalibration requirement matrix for the GRS 77 and GMU 44. Recalibration requirements differ depending on what maintenance actions have been accomplished.

**Table 7-5. GRS/GMU Calibration Requirement Matrix**

| Condition                                                                                                                 | Calibrations Required                               |                                                    |                                                    |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
|                                                                                                                           | Procedure A1:<br>GRS 77 Pitch/Roll<br>Offset        | Procedure B:<br>GRS/GMU<br>Magnetic<br>Calibration | Procedure D:<br>Engine Run-up<br>Vibration<br>Test |
| GMU 44 was removed and/or replaced with new unit.                                                                         |                                                     | X                                                  |                                                    |
| GRS 77 AHRS was removed and/or replaced. The mounting tray was NOT removed and the mounting tray bolts were NOT loosened. | None Required.<br>Continue to GRS/GMU Test section. |                                                    |                                                    |
| GRS 77 AHRS was removed and/or replaced. The mounting tray WAS removed and/or mounting tray bolts WERE loosened.          | X                                                   | X                                                  | X                                                  |
| GRS 77 AHRS Configuration Module was replaced.                                                                            | X                                                   | X                                                  | X                                                  |

### **GRS 77 Recalibration Criteria**

No recalibration is required for GRS 77 unit removal or replacement unless the mounting bolts that secure the AHRS mounting rack have been loosened or the GRS 77 configuration module has been replaced.

- If the GRS 77 mounting rack bolts were not loosened and if the GRS 77 configuration module has not been replaced, continue to the GRS/GMU testing section.
- If the GRS 77 mounting rack bolts have been loosened, or, if the GRS 77 configuration module has been replaced, perform the following procedures:
  - Pitch/Roll Offset Calibration (Procedure A1, refer to Section 7.7.2.1)
  - Magnetometer Calibration (Procedure B, refer to Section 7.7.2.3)
  - Engine Run-Up Vibration Test (Procedure D, refer to Section 7.7.2.4)

### **GMU 44 Recalibration Criteria**

If the GMU 44 was removed and/or replaced, perform the Magnetometer calibration (Procedure B).

---

### **GRS 77 Output Validity**

System software for certain aircraft allows valid outputs from the AHRS prior to completion of the AHRS and magnetometer calibration procedures, as long as the GRS 77 can definitively determine that the aircraft is not moving. This gives a technician the ability to perform functional tests during aircraft assembly that require valid AHRS outputs. Additionally, a “CALIBRATE AHRS/MAG” message will be displayed on the PFD until a successful calibration has been completed.

The criteria used by the AHRS to determine the aircraft is moving are as follows:

1. If valid GPS data is available and each component of 3D GPS velocity is less than 4 knots, the aircraft is considered “not moving” and attitude/heading will become valid.
2. If valid 3D GPS data is not available, but valid true airspeed is less than 30 knots, the aircraft is considered “not moving” and attitude/heading will become valid.
3. If both 3D GPS and true airspeed are unavailable, attitude/heading will not become valid.

### **Recalibration Procedures**

There are six calibration procedures available for the GRS 77 and GMU 44 listed below. Those not applicable to DA40 are noted as ‘NOT PROVIDED’. Do not attempt to use those procedures or the GRS/GMU will need to be recalibrated.

- Pitch/Roll Offset: (Procedure A1, PROVIDED IN SECTION 7.7.2.1)
- Pitch/Roll Offset, Manual Entry: (Procedure A2, NOT PROVIDED)
- Magnetometer Calibration: (Procedure B, PROVIDED IN SECTION 7.7.2.3)
- Heading Offset Compensation: (Procedure C, NOT PROVIDED)
- Engine Run-Up Vibration Test: (Procedure D, PROVIDED IN SECTION 7.7.2.4)
- Magnetometer Interference Test: (Procedure E, PROVIDED IN SECTION 7.7.2.5)

### **NOTE**

Procedures A2 and C are not required and should not be performed on DA 40 aircraft.

When ready to perform the procedures, shut the PFD and MFD off by pulling the PFD and MFD circuit breakers. Restart both displays in configuration mode. Follow the steps given for each procedure on-screen at the GRS/GMU CALIBRATION page. Note that the CALIBRATE command cannot be selected and activated until the technician acknowledges all required steps have been carried out by pressing the ENT key on each step.

### 7.7.2.1 Procedure A1: GRS 77 Pitch/Roll Offset Calibration

This first procedure must be carried out with the engine off and the aircraft stationary in calm air.

1. Level the aircraft to within  $\pm 0.25^\circ$  of zero pitch and zero roll using a digital level. (Follow instructions in DA 40 Aircraft Maintenance Manual for leveling).
2. Start the G1000 system in Configuration mode.
3. Go to the GRS Page Group and select the GRS/GMU Calibration page at the PFD. This page is protected and the following softkey password must be entered at the PFD to continue:
  - a) 9
  - b) 10
  - c) 11
  - d) 12 (Far Right softkey)



**Figure 7-13. GRS/GMU Calibration Page**

4. Ensure that the No. 1 GRS 77 is selected in the SELECT GRS UNIT window on the PFD.
  - a) Activate the cursor and highlight the SELECT PROCEDURE window and select PITCH/ROLL OFFSET.
  - b) Press the ENT key.
  - c) Use the cursor to highlight the BEFORE CALIBRATION window.
  - d) Follow the checklist items displayed on the PFD and press the ENT key as each step is completed or confirmed.
  - e) When the CALIBRATE field is blinking, press the ENT button to begin the procedure.
  - f) After several seconds, a new checklist appears in the lower half of the PFD. Press the ENT key as each step is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is blinking, press the ENT key to continue.
5. The result of the pitch/roll offset compensation is displayed on the PFD. If successful, the AHRS records the required pitch and roll offsets, informs the operator of a successful conclusion and returns to normal operation.

- 
6. Press the ENT key on the PFD to conclude this procedure.

The Magnetometer Calibration Procedure (Calibration Procedure B) must be carried out at a site that is determined to be free of magnetic disturbances. If it is unsure whether the site is 'clean' the technician should verify that the site is 'clean' by following the guidance provided in Section 7.7.2.2. The technician may skip Section 7.7.2.2 if the site condition is acceptable.

### **7.7.2.2 Compass Rose Evaluation of Magnetic Disturbances for Magnetometer Calibration Procedure (Optional)**

#### **NOTE**

Typically, a compass rose is an acceptable location to perform the magnetometer calibration procedure. However, because not all compass roses are well maintained, even an existing compass rose should be regularly evaluated using the method described here to determine if it is free of magnetic disturbances. If evaluation of an existing compass rose indicates that magnetic disturbances are present, then an alternative location must be found to perform the Magnetometer Calibration Procedure.

A G1000-equipped DA 40 airplane can be used to evaluate a candidate site for magnetic disturbances and determine whether it is a suitable location to perform the magnetometer calibration procedure. The magnetometer calibration procedure itself contains the logic to simultaneously survey the location for magnetic cleanliness while it is computing the magnetometer calibration parameters.

The G1000-equipped DA 40 used to evaluate the site must have already completed the pitch/roll offset compensation procedure (Procedure A-1). However, prior completion of the Magnetometer Calibration Procedure (Procedure B) is not required.

In order to evaluate a candidate site, the Magnetometer Calibration Procedure must be performed twice: once turning clockwise around the site, and once turning counter-clockwise. Both times, the procedure should be conducted as described in Section 7.7.2.3 of this document, with the exception of the direction of turns around the site.

#### **NOTE**

Although Section 7.7.2.3 indicates that the Magnetometer Calibration Procedure should be performed by making a series of clockwise turns around the site, the procedure can also be performed by making counter-clockwise turns for the purpose of evaluating the site for magnetic disturbances.

If, upon completion of the Magnetometer Calibration Procedure in each clockwise and counter-clockwise direction, the PFD displays the "CALIBRATION SUCCESSFUL / SITE IS CLEAN" message, then the candidate site is sufficiently free of magnetic disturbances and is acceptable for performing the Magnetometer Calibration Procedure. It is important to obtain successful result in both the clockwise and counter-clockwise directions to ensure that the magnetometer sweeps over a large enough area at the candidate site.

If, upon completion of the Magnetometer Calibration Procedure in either of the two directions, the PFD displays either the "MAG FIELD AT SITE NOT UNIFORM", or "MAG FIELD AT SITE DIFFERS FROM IGRF MODEL" message, then the site contains magnetic disturbances that are too large. A different area should be selected to perform the magnetometer calibration.

### 7.7.2.3 Procedure B: GRS 77/GMU 44 Magnetometer Calibration

Procedure A-1 must first be successfully accomplished before performing Procedure B, only for situations where the GRS 77 was replaced with a new unit.

Calibration Procedure B must be carried out on a compass rose in order to guarantee measurements free of environmental magnetic disturbances. Attempting to carry out this maneuver on a typical ramp area may not yield a successful calibration. The accuracy of the AHRS cannot be guaranteed if this calibration is not performed on a magnetically clean compass rose. If the compass rose condition is not known, it is recommended that the technician follow the guidance in Section 7.7.2.3.

1. Start the aircraft engine following the procedures referenced in the G1000/DA40 AFMS.
2. After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose.
3. At the compass rose, align the aircraft to a heading of magnetic north ( $\pm 5^\circ$ ).

#### **CAUTION**

CALIBRATION PROCEDURE B MUST BE CARRIED OUT ON A COMPASS ROSE IN ORDER TO GUARANTEE MEASUREMENTS FREE OF ENVIRONMENTAL MAGNETIC DISTURBANCES. ATTEMPTING TO CARRY OUT THIS MANEUVER ON A TYPICAL RAMP AREA MAY NOT YIELD A SUCCESSFUL CALIBRATION. THE ACCURACY OF THE AHRS CANNOT BE GUARANTEED IF THIS CALIBRATION IS NOT PERFORMED ON A MAGNETICALLY CLEAN COMPASS ROSE OR EQUIVALENT.

4. Restart the PFD and MFD in configuration mode.
5. Go to the GRS Page Group on the PFD (note that engine instruments may be monitored at this page).



**Figure 7-14. GRS/GMU Calibration Page**

6. Select the GRS/GMU Calibration page and enter the following softkey password:
  - a) 9
  - b) 10
  - c) 11
  - d) 12 (Far Right softkey)

- 
7. Activate the cursor and highlight the SELECT PROCEDURE window and select MAGNETOMETER.
  8. Press the ENT button.
  9. Use the cursor to highlight the BEFORE CALIBRATION window.
  10. Follow the checklist items displayed on the PFD and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
  11. The PFD display advises the operator when to turn the aircraft, when to stop, and when to turn again.
  12. Upon instruction to turn, taxi the aircraft in a right turn. After approximately 25° to 30° of turn from the last heading, the PFD display advises the operator to stop the aircraft.

**NOTE**

Due to the difficulties in executing smooth, accurate turns the PFD may incorrectly interpret a station and instruct to “HOLD POSITION” prior to full completion of a 30° turn. If this scenario is encountered, it is best for the operator to ignore the “HOLD POSITION” command and instead use outside references to complete the approximate 30° turn. Instead of using the PFD instruction to turn as a real-time indication of when to turn, simply judge the 30° (±5°) turn increments of the aircraft by using the compass rose radials. Dwelling at these 30° increments for the time recommended by the PFD should result in successful calibration.

13. The PFD guides the operator to dwell at multiple headings around a complete circle.

**NOTE**

Due to high winds or excessive airframe vibration, the operator may encounter a condition where the PFD restarts the 18-second countdown without full completion of the previous countdown. If this is encountered more than once for a given station, the operator should begin turning to the next station (approximately 30°). A minimum of 2 successful stations per quadrant is required, where a successful station is a full 18-second countdown followed by instruction to move. Ensure that at least 2 stations per quadrant are completed. Thus, it may sometimes be required to dwell at a station after a countdown restart. A maximum of 30 stations is allowed for the entire calibration procedure. If too many countdown restarts are encountered, the calibration will fail with the message, “TOO MANY STATIONS.”

14. Repeat the turn-and-stop process until the PFD advises that a successful calibration is complete. The GRS 77 AHRS then enters its normal operational mode. Press the ENT button on the PFD to conclude this procedure.
15. Repeat the turn-and-stop process until the PFD advises that a successful calibration is complete. The GRS 77 AHRS then enters its normal operational mode. Press the ENT button on the PFD to conclude this procedure.

### 7.7.2.4 Procedure D: Engine Run-Up Vibration Procedure

Calibration Procedure D must be performed in order to guarantee that the AHRS mounting is sufficiently rigid and insensitive to vibration.



**Figure 7-15. GRS/GMU Calibration Page**

1. Initiate the AHRS engine run-up vibration test procedure by performing the following steps:
  - a) Select the ENGINE RUN-UP TEST procedure and press the ENT key.
  - b) Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
2. The PFD display instructs the operator to gradually increase power from idle to full throttle and back to idle over a period of 2-4 minutes.
3. When the operator has completed the engine run-up and the engine is back to an idle setting, press the ENT key to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
4. The PFD informs the operator if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified and associated numeric values are displayed on the PFD.

#### **NOTE**

Should a failure occur, the technician may perform the Engine Run-up test up to 3 times successively before corrective action must be taken. If the test does not pass after three attempts, then the installation should not be considered reliable until the source of the vibration problem is identified and remedied. In the event of repeated failure of the engine run-up test, record the values that are reported to be out of range for future reference.

The following are potential causes for failure of the engine run-up test:

- a) Vibration motion of GRS77 and/or GMU44 caused by neighboring equipment and/or supports.
- b) Mounting screws and other hardware for GRS77 and/or GMU44 not firmly attached.
- c) GRS77 connector not firmly attached to unit.
- d) Cabling leading to GRS77 or GMU44 not firmly secured to supporting structure.
- e) An engine / propeller that is significantly out of balance.

5. Press the ENT key on the PFD to conclude this procedure and proceed to the GRS/GMU Testing section.

### 7.7.2.5 Procedure E: Magnetometer Interference Test

This procedure validates that no electronic device is interfering with the operation of the GMU magnetometer which directly impacts the determination of attitude and heading by the GRS. Calibration Procedures A-1 through D are not required prior to this execution of this procedure.



**Figure 7-16. Magnetometer Interference Test Page**

1. Enter Configuration Mode and go to GRS/GMU Calibration page as shown in Figure 7-16.
2. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence: 9, 10, 11, and 12.
3. Select GRS unit and press the ENT key.
4. Select MAG INTERFERENCE TEST and press the ENT key.
5. Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed.

#### **NOTE**

The 3<sup>rd</sup> item on the checklist instructs the operator to “prepare a detailed test sequence with precise start and stop times for exercising all electronic devices”. Only the electronic devices that are likely to affect the operation of the GMU 44 magnetometer need be included in the test sequence. The list of relevant electronic devices will vary from aircraft to aircraft. An example of an appropriate test sequence is given in Table 7-2.

**Table 7-6. Magnetometer Interference Test Sequence (Example)**

| Elapsed Time since Start of Test (min:secs) | Action             |
|---------------------------------------------|--------------------|
| 0:00                                        | Test begins        |
| 0:10                                        | Aileron full right |
| 0:20                                        | Aileron full left  |
| 0:30                                        | Aileron level      |

**Table 7-6. Magnetometer Interference Test Sequence (Example, Cont).**

| Elapsed Time since Start of Test (min:secs) | Action                                                                                                               |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 0:40                                        | Flaps down                                                                                                           |
| 0:50                                        | Flaps up                                                                                                             |
| 1:00                                        | Landing gear up                                                                                                      |
| 1:20                                        | Landing gear down                                                                                                    |
| 1:40                                        | Speed brake up                                                                                                       |
| 1:50                                        | Speed brake down                                                                                                     |
| 2:00                                        | Navigation lights on                                                                                                 |
| 2:10                                        | Navigation lights off                                                                                                |
| 2:20                                        | Landing lights on                                                                                                    |
| 2:30                                        | Landing lights off                                                                                                   |
| 2:40                                        | Taxi lights on                                                                                                       |
| 2:50                                        | Taxi lights off                                                                                                      |
| 3:00                                        | Landing + Taxi lights on                                                                                             |
| 3:10                                        | Landing + Taxi lights off                                                                                            |
| 3:20                                        | Strobes on                                                                                                           |
| 3:30                                        | Strobes off                                                                                                          |
| 3:40                                        | Recognition lights on                                                                                                |
| 3:50                                        | Recognition lights off                                                                                               |
| 4:00                                        | Turn on all wing-tip lights simultaneously (typically will include navigation lights, recognition lights and strobe) |
| 4:10                                        | Turn off all wing-tip lights simultaneously                                                                          |
| 4:20                                        | Beacon on                                                                                                            |
| 4:30                                        | Beacon off                                                                                                           |
| 4:40                                        | Pitot heat on                                                                                                        |
| 4:50                                        | Pitot heat off                                                                                                       |
| 5:00                                        | End of test                                                                                                          |

- When the CALIBRATE field is blinking, press the ENT key to begin the procedure, and have a stopwatch ready to begin recording the elapsed time.

**NOTE**

It is important that the “time equals zero” moment corresponds with the moment the PFD first displays the blinking TEST COMPLETE message. The operator should carry out the actions called for in the prepared test sequence.

- It is important that all actions are carried out in the order and at the precise elapsed time as specified in the prepared test sequence. When the operator has completed the actions specified in the test sequence, press the ENTER button to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking. The PFD informs the operator if the installation has passed or failed the magnetometer interference test. If the test passes, no further action is required for this test.
- If the test fails, the installation should be considered unreliable until the source of magnetic interference is identified and remedied. When the magnetometer interference test fails, record the three magnetometer maximum deviation values and their corresponding timestamps. Any maximum deviation value greater than 2.5 milliGauss indicates a problem that must be resolved.

Compare the corresponding timestamps with the prepared test sequence to identify which action produced the problem. Contact Garmin for assistance in resolving the problem.

#### **NOTE**

Two common reasons for a failed magnetometer interference test are: 1) new equipment is installed in close proximity to the GMU 44 magnetometer, and 2) an existing or new electronic device has become grounded through the aircraft structure instead of via the proper ground wire in a twisted shielded pair.

9. Press the ENT key on the PFD to conclude this procedure.

### **7.7.3 GRS/GMU Testing**

The aircraft can now be taxied back and the engine can be shut down for final testing. Restart both displays in normal mode to conduct final system checks. When the PFD powers up in normal mode, the AHRS attitude and heading information displayed should become valid within 1 minute of power-up, as shown in Figure 7-17 (provided both GPS receivers have a valid position; if GPS is unavailable, AHRS initialization may take as long as 2 minutes).



**Figure 7-17. Normal Mode AHRS Check**

Test the AHRS reversionary paths by pressing the red reversionary mode button on the audio panel. Ensure that both displays have valid AHRS information, as shown in Figure 7-18.



**Figure 7-18. Reversionary Mode AHRS Information**

On the PFD, open the ALERT window and verify there are no GRS or GMU MANIFEST or configuration errors. If no other service is to be performed, continue to the return-to-service checks in Section 8.

---

## 7.8 GDL 69 XM Data Link

### Original GDL 69 is Reinstalled

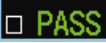
No software or configuration loading is required if the removed GDL 69 is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.8.2 if the original unit with no repairs was reinstalled. Continue to section 7.8.1 for repaired or exchanged units.

### New, Repaired or Exchanged GDL 69 is Installed

If a new, repaired, or exchanged GDL 69 is installed, the correct software and configuration files must be loaded to the unit, and then the XM Satellite Radio subscription must be reactivated. See the XM Activation Instructions listed in Table 1-2. Continue to the software loading procedure.

### **7.8.1 GDL 69 Software and Configuration File Loading**

If a new, repaired or exchanged GDL 69 is installed the correct software and configuration files must be loaded. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight OPTIONS in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to activate the drop-down menu. Move the cursor to highlight DA 40 Option – GDL69 and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files:
  - GDL COMPATABILITY UPDATE – software file
  - GDL SYSTEM – software and configuration files
9. Once the files are selected press the LOAD softkey.
10. When the upload is complete, press the ENT key to select OK in the upload complete window.
11. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
12. After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
13. Continue to the GDL 69 Testing section.

---

## 7.8.2 GDL 69 Testing

On the PFD, open the ALERT window and verify there are no GDL 69 MANIFEST or configuration error messages.

Go to the MFD AUX – XM RADIO page and verify that the GDL 69 is reporting its Radio ID number and receiving the XM PREVIEW channel. Refer to the Cockpit Reference Guide for details on XM Radio weather and music operation.

If the GDL 69 is replaced, the owner must update their subscription information with XM by providing them with the new GDL 69's Radio ID number(s). See the XM Activation Instructions listed in Table 1-2.

## 7.9 GDL 59 Datalink

### Original GDL 59 is Reinstalled

No software or configuration loading is required if the removed GDL 59 is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.9.2 if the original unit with no repairs was reinstalled. Continue to section 7.9.1 for repaired or exchanged units.

### New, Repaired or Exchanged GDL 59 is Installed

If a new, repaired, or exchanged GDL 59 is installed, the correct software and configuration files must be loaded to the unit. Continue to the software loading procedure. As well the GFDS subscription must be reactivated. See Section 3.5.14.

### 7.9.1 GDL 59 Software and Configuration File Loading

If a new, repaired or exchanged GDL 59 is installed the correct software and configuration files must be loaded. Determine if a GSR 56 is also installed in the aircraft to select the proper option file on the G1000 system software loader card. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight OPTIONS in the menu and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to activate the drop-down menu. Move the cursor to highlight the 'DA 40 Option - GDL59/GSR56' file and press ENT.
7. Press the CLR ALL softkey.
8. Using the FMS knob and ENT key, select the following files:
  - GDL59 – software and configuration files
  - GDL59 ROUTER – software file

- GDL59 ROUTER FILE SYSTEM – software file
- Once the files are selected press the LOAD softkey.
  - When the upload is complete, press the ENT key to select OK in the upload complete window.
  - Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
  - After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
  - Continue to the testing section.

## 7.9.2 GDL 59 Test

This check verifies the GDL 59 is configured and is functional. This check requires that the aircraft be positioned outside for Iridium satellite reception.

On the PFD, open the ALERT window and verify there are no GDL 59 MANIFEST or configuration error messages.

- Position the aircraft outside in a clear unobstructed area for Iridium satellite reception.
- Power up the PFD in configuration mode.
- On the PFD, select the GDL page group using the large FMS knob.
- Using the small FMS knob select the GSR56 Configuration page. Verify the page can be displayed and information is available.

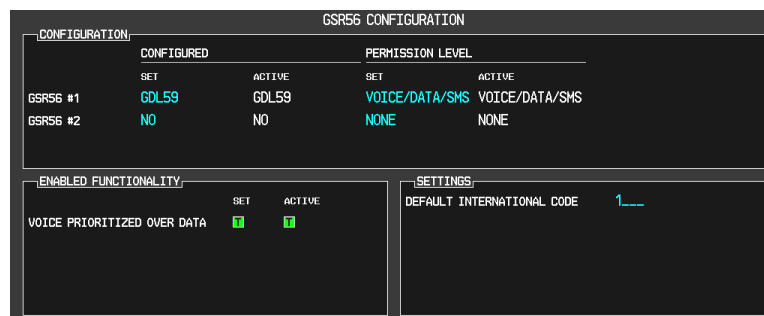


**Figure 7-19. GSR 56 Configuration Page for Combination Option**

- Restart the G1000 System in Normal Mode.
- On the MFD, using the large FMS knob, select the AUX page group, then using the small FMS knob, select the AUX-TELEPHONE page.
- Ensure the system is displaying Iridium signal strength in green, Figure 7-20. If the Iridium signal strength is displayed in blue there is no signal present.



**Figure 7-20. Good Iridium Signal Strength**



**Figure 7-21. No Iridium Signal Strength**

8. On the GMA, press TEL button.
9. On the MFD, press the DIAL softkey.
10. On the MFD, enter the test phone number in the ENTER PHONE NUMBER field using the FMS knobs or softkeys on the lower bezel.
11. On the MFD, press the ENT key to accept the phone number.
12. On the MFD, press the ENT key to initiate the dialing sequence.
13. When call is complete, on the MFD, press the HANGUP softkey on the AUX – TELEPHONE page to end the call.

## **7.10 GSR 56**

### *Original GSR 56 is Reinstalled*

There are no software or configuration files loaded to the GSR 56. Continue to Section 7.10.1

### *New, Repaired or Exchange GSR 56 is Installed*

If a new, repaired, or exchanged GSR 56 is installed, no software or configuration files are loaded to the GSR 56. Continue to Section 7.10.1. As well the GFDS subscription must be reactivated. See Section 3.5.14.

### 7.10.1 GSR 56 Testing

This check verifies the GSR 56 is configured and is functional. This check requires that the aircraft be positioned outside for Iridium satellite reception.

1. Position the aircraft outside in a clear unobstructed area for Iridium satellite reception.
2. Power up the PFD in configuration mode.
3. On the PFD, select the GDL page group using the large FMS knob.
4. Using the small FMS knob select the GSR56 Configuration page. Verify the page can be displayed and information is available.

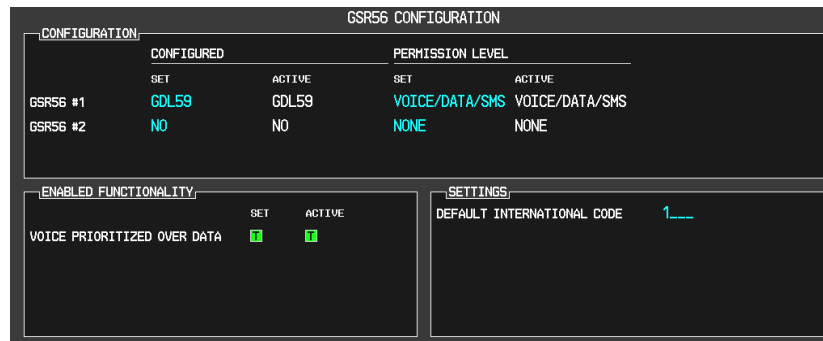


**Figure 7-22. GSR 56 Configuration Page for Combination Option**

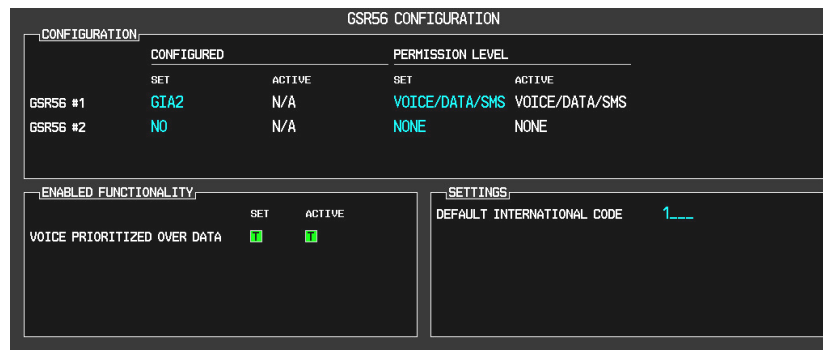


**Figure 7-23. GSR 56 Configuration Page for Standalone Option**

5. Restart the G1000 System in Normal Mode.

### 7.10.1.1 GDL59 / GSR 56 Combination Option

1. On the MFD, using the large FMS knob, select the AUX page group, then using the small FMS knob, select the AUX-TELEPHONE page.
2. Ensure the system is displaying Iridium signal strength in green, Figure 7-24. If the Iridium signal strength is displayed in blue there is no signal present.



**Figure 7-24. Good Iridium Signal Strength**



**Figure 7-25. No Iridium Signal Strength**

3. On the GMA, press TEL button.
4. On the MFD, press the DIAL softkey.
5. On the MFD, enter the test phone number in the ENTER PHONE NUMBER field using the FMS knobs or softkeys on the lower bezel.
6. On the MFD, press the ENT key to accept the phone number.
7. On the MFD, press the ENT key to initiate the dialing sequence.

When call is complete, on the MFD, press the HANGUP softkey on the AUX – TELEPHONE page to end the call.

### 7.10.1.2 GSR 56 Standalone Option

1. Press the FPL button on the MFD and enter a simple flight plan.
2. Access the MAP – WEATHER DATA LINK page by turning the large FMS knob to select the MAP page group and then turning the small FMS knob to select the Weather Data Link page.
3. On the MFD, select the MENU softkey.
4. On the MFD, use the large or small FMS knob and select DISPLAY GFDS WEATHER, then press ENT and verify the following:
  - MAP – Weather Data Link page header has (GFDS) after the page name.
  - GFDS Data Request window opens.
5. Rotate the large FMS knob on the MFD to select the following coverage options
  - PRESENT POSITION
  - FPL

6. Rotate the large FMS knob on the MFD to highlight the FPL field and then rotate the small FMS knob to select REMAINING FPL then press the ENT key on the MFD.
7. Rotate the large FMS knob on the MFD to highlight the DIAMETER / RTE WIDTH field and then rotate the small FMS knob to select 100NM then press the ENT key on the MFD.
8. Rotate the large FMS knob on the MFD to highlight the AUTO REQUEST UPDATE RATE field and then rotate the small FMS knob to select OFF then press the ENT key on the MFD.
9. Rotate the large FMS knob on the MFD to highlight the SEND REQ button and then press the ENT key on the MFD.
10. Verify that REQUEST STATUS field indicates “Contacting GFDS” and then indicates “OK” when the request is complete.

#### **NOTE**

It may be necessary to repeat the request to observe a successful GFDS Weather update.

11. On the MFD, press the FMS knob to close the GFDS Data Request window.

## **7.11 GSA 81 Servo**

### **Original GSA 81 Reinstalled:**

No software or configuration loading is required if the original GSA 81 is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to Section 7.11.2 if the original unit with no repairs was reinstalled. Continue to Section 7.11.1 for repaired or exchanged units.

### **New, Repaired or Exchanged GSA 81 Installed:**

If a new, repaired, or exchange GSA is installed, install software and gain files. Continue to the software and gain loading procedure.

#### **7.11.1 GSA 81 Software and Gain File Loading**

If a new, repaired or exchanged GSA 81 is installed the correct software and gain files must be loaded. Determine if a GSM 85 or GSM 86 servo mount is also installed in the aircraft to select the proper option file on the G1000 system software loader card. Follow the procedure below to load the files.

1. Remove the bottom SD cards from the displays. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the correct G1000 software loader card that matches the existing G1000 system software version in the PFD top card slot.
3. Start the displays in configuration mode.
4. On the PFD, go to the System Upload Page using the small FMS knob.
5. Push the FMS knob to activate the cursor, then rotate the small FMS knob to display a drop-down menu in the AIRFRAME field. Turn the small FMS knob to highlight OPTIONS in the menu and press the ENT key.

- 
6. Once an airframe type is selected the cursor moves to the FILE field. Rotate the small FMS knob to activate the drop-down menu. Move the cursor to highlight the 'DA 40 Option – Standard GFC700' or 'DA 40 Option – Enhanced GFC700' file and press ENT.
  7. Press the CLR ALL softkey.
  8. Using the FMS knob and ENT key, select the following files for the replaced servo position (Pitch, Pitch Trim or Roll):
    - SERVO SOFTWARE – software file
    - SERVO GAINS – software file
  9. Once the files are selected press the LOAD softkey.
  10. When the upload is complete, press the ENT key to select OK in the upload complete window.
  11. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
  12. After the software and configuration files are loaded, turn off the system and remove the G1000 system software loader card. Reinsert the supplemental database cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
  13. Continue to the GSA 81 Testing section.

### **7.11.2 GSA 81 Testing**

On the PFD, open the ALERT window and verify there are no GFC MANIFEST or configuration error messages.

Perform the GFC 700 Ground Test Procedure in Section 8.3.

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## 8 System Return to Service Procedure

### 8.1 Software Verification

After reinstalling any G1000 LRU, verify the correct LRU software part numbers and versions against the numbers listed on the appropriate General Arrangement drawing (see Table 1-2).

1. Start the G1000 system in configuration mode.
2. The PFD's System Status page shows a list of LRUs in the LRU window. Activate the cursor and highlight the LRU window. Use the FMS knob to scroll through the list in the window and select the following LRUs.

**Table 8-1. Return To Service Software Check**

| <u>LRU</u>                      | <u>SW VER</u> | <u>LRU</u>                    | <u>SW VER</u> |
|---------------------------------|---------------|-------------------------------|---------------|
| ADF 1 <sup>(5)</sup>            | _____         | GPS1                          | _____         |
| COM 1 <sup>(2)</sup>            | _____         | GPS2                          | _____         |
| COM 2 <sup>(2)</sup>            | _____         | GRS1                          | _____         |
| GDC1                            | _____         | GRS1 FPGA                     | _____         |
| GDC1 FPGA                       | _____         | GRS1 MV DB                    | _____         |
| GDL 59 <sup>(6)</sup>           | _____         | GS 1                          | _____         |
| GDL 59 Router <sup>(6)</sup>    | _____         | GS 2                          | _____         |
| GDL 59 Router FS <sup>(6)</sup> | _____         | GSA PTCH CTL <sup>(1)</sup>   | _____         |
| GDL69                           | _____         | GSA PTCH MON <sup>(1)</sup>   | _____         |
| GEA1                            | _____         | GSA PTCH TRM C <sup>(1)</sup> | _____         |
| GFC CERT GIA1 <sup>(1)</sup>    | _____         | GSA PTCH TRM M <sup>(1)</sup> | _____         |
| GFC CERT GIA2 <sup>(1)</sup>    | _____         | GSA ROLL CTL <sup>(1)</sup>   | _____         |
| GFC CERT P C <sup>(1)</sup>     | _____         | GSA ROLL MON <sup>(1)</sup>   | _____         |
| GFC CERT P M <sup>(1)</sup>     | _____         | GSR 1 <sup>(7)</sup>          | None          |
| GFC CERT PT C <sup>(1)</sup>    | _____         | GTX1                          | _____         |
| GFC CERT PT M <sup>(1)</sup>    | _____         | MFD1                          | _____         |
| GFC CERT R C <sup>(1)</sup>     | _____         | MFD1 FPGA                     | _____         |
| GFC CERT R M <sup>(1)</sup>     | _____         | NAV 1 <sup>(3)</sup>          | _____         |
| GIA1                            | _____         | NAV 1 BB <sup>(3)</sup>       | _____         |
| GIA1 AUDIO                      | _____         | NAV 1 FPGA <sup>(3)</sup>     | _____         |
| GIA2                            | _____         | NAV 2 <sup>(3)</sup>          | _____         |
| GIA2 AUDIO                      | _____         | NAV 2 BB <sup>(3)</sup>       | _____         |
| GMA1                            | _____         | NAV 2 FPGA <sup>(3)</sup>     | _____         |
| GMU1                            | _____         | PFD1                          | _____         |
| GMU1 FPGA                       | _____         | PFD1 FPGA                     | _____         |

Note 1 - GFC 700-equipped aircraft.

Note 2 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the COM 1 and COM 2 software version is dependent on the hardware and is not field loadable. The software levels may not be the same.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 3 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the NAV 1 and NAV 2, software version is dependent on the hardware and is not field loadable. The software levels may not be the same and NAV 1 BB, NAV 1 FPGA, NAV 2 BB, NAV 2 FPGA will be displayed as UNKNOWN.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 4 – With GIA 63W P/N 011-01105-00 and 011-01105-01, GIA 63 P/N 011-00781-00 and 011-00781-01 the GS 1 and GS 2 software version is dependent on the hardware and is not field loadable. The software levels may not be the same.

With GIA63W P/N 011-01105-20 the software is field loadable and is loaded with the GIA 63W software loaded in the baseline configuration.

Note 5 – Aircraft with ADF installed, third party ADF will not report software version and will be displayed as UNKNOWN.

Note 6 – GDL 59 equipped aircraft.

Note 7 – GSR 56 equipped aircraft.

3. The software part number and version is displayed in the DATA window. Compare this to the software configuration shown in the appropriate General Arrangement drawing (see Table 1-2).

### **IMPORTANT!**

It is essential that the software versions be checked and matched against the listed versions in the appropriate General Arrangement drawing. Software Configuration is a critical part of the G1000 operation and must be verified before returning an aircraft to service.

## **8.2 Backup Path System Testing**

This final checkout tests various secondary communications paths to ensure that the paths function correctly.

Perform the following steps and verify the results of each test.

- Start the G1000 in normal mode.
- Before starting, create a simple Direct-To flight plan to an airport or other waypoint that is greater than 31 NM from the present aircraft position. Verify that the phase of flight displayed on the GPS CDI is ENR.
- Verify that no 'Backup Path failure' alerts are present. If they are, troubleshoot per Section 5.6 before continuing. All backup paths must be operational before returning the aircraft to service.

## 8.2.1 GPS Failure Test

This test verifies that the system responds appropriately to GPS position losses.

**Table 8-2. GPS Failure Test**

| Step                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Single GPS Failure Conditions:</p> <ol style="list-style-type: none"><li>1. Place a shroud over the GPS antenna for GIA1 to prevent signal reception. Verify loss of signal on MFD AUX page 3.</li><li>2. Check for desired results.</li><li>3. Remove shroud from the GIA1 GPS antenna and allow GPS 1 to reacquire satellites.</li><li>4. Place a shroud over the GPS antenna for GIA2 to prevent signal reception. Verify loss of signal on MFD AUX page 3.</li><li>5. Check for desired results.</li><li>6. Remove shroud from the GIA2 GPS antenna and allow GPS 2 to reacquire satellites.</li></ol> | <p>GPS Failure – For each of the specified GPS failure conditions, the following shall remain valid on the PFD throughout the procedure:</p> <ul style="list-style-type: none"><li>✓ Attitude and Heading from AHRS.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT from Air Data Computer.</li><li>✓ GPS Course Deviation Indicator remains valid on PFD.</li><li>✓ Press the ALERTS softkey and verify that the “AHRS1 GPS – AHRS using backup GPS source” alert is given (GPS1 failure only).</li></ul> <p>“AHRS1 GPS – AHRS 1 not receiving backup GPS information” alert is given (GPS2 failure only).</p>                                                                                                                                                                                                                                                                      |
| <b>(SW v0321.19 or earlier)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>Dual GPS Failure Conditions:</p> <ol style="list-style-type: none"><li>1. Cover both GPS antennas. Verify loss of signal on MFD AUX page 3.</li><li>2. Check for desired results.</li><li>3. Remove shrouds from GPS antennas.</li><li>4. Allow both receivers to re-acquire satellite signals before continuing.</li></ol>                                                                                                                                                                                                                                                                                | <p>Dual GPS Failure – For a dual GPS failure, the following shall occur:</p> <ul style="list-style-type: none"><li>✓ GPS CDI is removed.</li><li>✓ HSI flags DR on PFD, all GPS data AMBER.</li><li>✓ Attitude and Heading remain valid from AHRS.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer.</li><li>✓ GPS NAV LOST alert given (press ALERTS softkey).</li><li>✓ TAWS N/A aural alert &amp; annunciation given.*</li></ul> <p>When GPS satellites are re-acquired, verify that the INTEG OK annunciation is given on the HSI in white for a brief period of time then disappears.</p> <p>After ~10 seconds of stable GPS position reacquisition, verify the TAWS AVAILABLE aural alert is given.</p> <p>Verify that the system returns to normal navigation mode (GPS CDI restored, DR annunciation removed, &amp; GPS data magenta).</p> |

**Table 8-2. GPS Failure Test (Cont)**

| Step                                                                                                                                                                                                                                                                                                                         | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(SW v0321.22 or later)</b>                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Dual GPS Failure Conditions: <ol style="list-style-type: none"> <li>1. Cover both GPS antennas. Verify loss of signal on MFD AUX page 3.</li> <li>2. Check for desired results.</li> <li>3. Remove shrouds from GPS antennas.</li> <li>4. Allow both receivers to re-acquire satellite signals before continuing.</li> </ol> | Dual GPS Failure – For a dual GPS failure, the following shall occur: <ul style="list-style-type: none"> <li>✓ GPS CDI is removed</li> <li>✓ HSI flags LOI on PFD within 30 seconds, all GPS data is removed from the GPS Fields</li> <li>✓ Attitude and Heading remain valid from AHRS.</li> <li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer.</li> <li>✓ GPS NAV LOST alert given (press ALERTS softkey)</li> <li>✓ TAWS N/A annunciation given.*</li> </ul> When GPS satellites are re-acquired, verify that the INTEG OK annunciation is given on the HSI in white for a brief period of time then disappears.<br><br>Verify that the system returns to normal navigation mode (GPS CDI restored, LOI annunciation removed, & GPS data magenta). |

\*If equipped.

## 8.2.2 GIA Failure Test

This test verifies redundant systems operate as intended.

For this test, provide a valid localizer signal to NAV1 and NAV2.

**Table 8-3. GIA Failure Test**

| Step                                                                                                                                                                                                                                                                                                        | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Single GIA Failure Conditions: <ol style="list-style-type: none"> <li>1. On the PFD select CDI to LOC1.</li> <li>2. Remove power from GIA1 by pulling NAV/GPS1 and COM1 breakers.</li> <li>3. Check for desired results.</li> <li>4. Restore power to GIA1. Allow GPS1 to re-acquire satellites.</li> </ol> | GIA1 Failure – For a GIA1 failure, <i>only</i> the following shall flag invalid: <ul style="list-style-type: none"> <li>✓ COM1/NAV1 field (PFD &amp; MFD).</li> <li>✓ NAV1 CDI loses deviation bar (PFD only).</li> <li>✓ Red AFCS status annunciation given.*</li> <li>✓ “AHRS1 using backup GPS” alert given.</li> <li>✓ ESP FAIL alert is given*</li> </ul>                                                                        |
| <ol style="list-style-type: none"> <li>5. On the PFD select CDI to LOC2.</li> <li>6. Remove power from GIA2 by pulling NAV/GPS2 and COM2 breakers.</li> <li>7. Check for desired results.</li> <li>8. Restore power to GIA2. Allow GPS2 to re-acquire satellites.</li> </ol>                                | GIA2 Power Failure – For a GIA2 failure, <i>only</i> the following shall flag invalid: <ul style="list-style-type: none"> <li>✓ COM2/NAV 2 field (PFD &amp; MFD).</li> <li>✓ NAV2 CDI loses deviation bar (PFD only).</li> <li>✓ Red AFCS status annunciation given.*</li> <li>✓ “AHRS not receiving backup GPS information” alert is given.</li> <li>✓ ADF/DME windows flag invalid.*</li> <li>✓ ESP FAIL alert is given*</li> </ul> |

\*If Equipped

**Table 8-3. GIA Failure Test (Cont)**

| <b>(SW v0321.19 or earlier)</b>                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dual GIA Failure Conditions: <ol style="list-style-type: none"><li>1. Remove power from both GIA units.</li><li>2. Check for desired results.</li><li>3. Restore power to both GIA units.</li></ol> | Dual GIA Failure – For a dual GIA failure, the following shall occur: <ul style="list-style-type: none"><li>✓ COM1/NAV1 &amp; COM2/NAV2 fields flag invalid.</li><li>✓ GPS CDI flags DR on PFD, all GPS data AMBER</li><li>✓ Verify that “DR” appears in amber superimposed over the ownship icon on the MFD map and PFD inset map.</li><li>✓ NAV1 &amp; NAV2 CDI loses deviation bar.</li><li>✓ XPDR field flags invalid on PFD.</li><li>✓ Engine Instrument field flags invalid on MFD.</li><li>✓ All AHRS &amp; ADC fields remain valid.</li><li>✓ “AHRS1 not receiving any GPS information” alert given.</li><li>✓ Red AFCS status annunciation given.*</li><li>✓ TAWS FAIL annunciation given.*</li><li>✓ ADF/DME windows flag invalid.*</li></ul>                                                                                                                                                                                                                                         |
| <b>(SW v0321.22 or later)</b>                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Dual GIA Failure Conditions: <ol style="list-style-type: none"><li>1. Remove power from both GIA units.</li><li>2. Check for desired results.</li><li>3. Restore power to both GIA units.</li></ol> | Dual GIA Failure – For a dual GIA failure, the following shall occur: <ul style="list-style-type: none"><li>✓ COM1/NAV1 &amp; COM2/NAV2 fields flag invalid.</li><li>✓ GPS CDI flags LOI on PFD, all GPS data is removed from the GPS Fields</li><li>✓ Verify that “NO GPS POSITION” appears in amber superimposed over the ownship icon on the MFD map and PFD inset map.</li><li>✓ “GPS NAV LOST” alert is given.</li><li>✓ NAV1 &amp; NAV2 CDI loses deviation bar.</li><li>✓ XPDR field flags invalid on PFD.</li><li>✓ “XPDR 1 Fail” alert is given.</li><li>✓ Engine Instrument field flags invalid on MFD.</li><li>✓ All AHRS &amp; ADC fields remain valid.</li><li>✓ “AHRS1 not receiving any GPS information” alert given.</li><li>✓ “GMA1 Fail” alert given.</li><li>✓ “Traffic Fail” alert given.*</li><li>✓ Red AFCS status annunciation given.*</li><li>✓ TAWS FAIL annunciation given.*</li><li>✓ ADF/DME windows flag invalid.*</li><li>✓ “TRN AUD FAIL” alert given.</li></ul> |

\*If equipped.

### 8.2.3 Display Failure Test

This test verifies redundant systems operate as intended, including automatic transition to reversionary mode. For this test:

- Provide a valid localizer signal to NAV1 and NAV2.
- Engage the autopilot by pressing the AP key on the MFD, if equipped.

**Table 8-4. Display Failure Test**

| Step                                                                                                                             | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MFD Display Failure Conditions:</b><br>1. Remove power from MFD.<br>2. Check for desired results.<br>3. Restore power to MFD. | The following shall occur when power is removed from the MFD:<br><ul style="list-style-type: none"><li>✓ PFD switches to reversion mode.</li><li>✓ AFCS does not disconnect.*</li><li>✓ Attitude and Heading remain valid on PFD.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid on PFD.</li><li>✓ Valid Engine Instrumentation appears on PFD.</li><li>✓ XPDR field remains valid on PFD.</li><li>✓ COM2/NAV2 fields flag invalid.</li><li>✓ NAV2 CDI deviation bar is removed.</li><li>✓ ADF/DME windows flag invalid.*</li><li>✓ “GDL 69 Fail” alert is given.*</li><li>✓ XTALK ERROR alert is given.</li><li>✓ ESP OFF alert is given*</li><li>✓ GDL 59 FAIL alert is given*</li></ul> |
| <b>PFD Display Failure Conditions:</b><br>1. Remove power from PFD.<br>2. Check for desired results.<br>3. Restore power to PFD. | The following shall occur when power is removed from the PFD:<br><ul style="list-style-type: none"><li>✓ MFD switches to reversion mode.</li><li>✓ AFCS disconnects.*</li><li>✓ Attitude and Heading remain valid on the MFD.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid on the MFD.</li><li>✓ MFD retains engine instrumentation.</li><li>✓ Valid XPDR field appears on MFD.</li><li>✓ COM1/NAV 1 fields flag invalid.</li><li>✓ NAV1 CDI deviation bar is removed.</li><li>✓ XTALK ERROR alert is given.</li><li>✓ ESP FAIL alert is given*</li></ul>                                                                                                                                |

\*If Equipped.

## 8.2.4 G1000 Backup Path Tests

Before performing these tests, remove power from both displays by pulling the PFD and MFD circuit breakers. Reboot the PFD and MFD while holding the ENT key on each display until the words INITIALIZING SYSTEM appear.

### NOTE

Screen shots in this section reflect the latest system software. For software version 0321.19 and earlier, data indicators are depicted as solid green, red, or black squares for valid, invalid, and unknown states, respectively.

1. In configuration mode, go to the GDU Page Group on the PFD.
2. On the PFD, activate the cursor and select PFD1 in the SELECT UNIT field and press ENT.
3. Observe the GRS 77 and GDC 74 DATA indicators in the ARINC 429 window.
4. Verify both indicators are GREEN (green check), indicating the channels are receiving data as shown below:

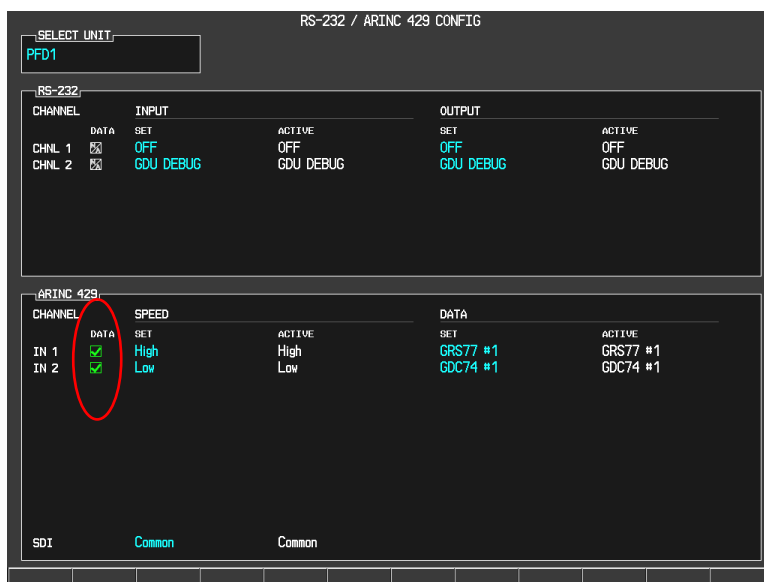


**Figure 8-1. PFD RS-232/ARINC 429 Configuration Page**

5. On the PFD, activate the cursor and select MFD1 in the SELECT UNIT field and press the ENT key. MFD 1 indications will be the same as presented in Figure 8-1.
6. Repeat Steps 3 and 4.

7. On the PFD, go to the GIA Page Group. Go to the RS-232 / ARINC 429 CONFIG page.
8. Verify that GIA1 is selected in the SELECT UNIT field.
9. Observe the data indicators for all configured RS-232 and ARINC 429 channels (except GIA DEBUG), including the GRS 77 and GDC 74 ARINC 429 channels.
10. Verify all DATA indicators for configured channels are GREEN (green check), indicating the channels are receiving data as shown below:

**RS-232 / ARINC 429 CONFIG**

**SELECT UNIT**  
GIA1

**RS-232**

| CHANNEL | DATA | INPUT             | ACTIVE            | OUTPUT            | ACTIVE            |
|---------|------|-------------------|-------------------|-------------------|-------------------|
| CHNL 1  | ✓    | GDC74 #1          | GDC74 #1          | GDC74 #1          | GDC74 #1          |
| CHNL 2  | ✓    | GIA DEBUG         | GIA DEBUG         | GIA DEBUG         | GIA DEBUG         |
| CHNL 3  | ✓    | OFF               | OFF               | OFF               | OFF               |
| CHNL 4  | ✓    | OFF               | OFF               | OFF               | OFF               |
| CHNL 5  | ✓    | GTIX 33 #1 w/ TIS | GTIX 33 #1 w/ TIS | GTIX 33 #1 w/ TIS | GTIX 33 #1 w/ TIS |
| CHNL 6  | ✓    | GRS77 #1          | GRS77 #1          | GRS77 #1          | GRS77 #1          |
| CHNL 7  | ✓    | GMA1347 #1        | GMA1347 #1        | GMA1347 #1        | GMA1347 #1        |
| CHNL 8  | ✓    | OFF               | OFF               | OFF               | OFF               |

**ARINC 429**

| CHANNEL | DATA | SPEED  | ACTIVE | DATA     | ACTIVE   |
|---------|------|--------|--------|----------|----------|
| IN 1    | ✓    | Low    | Low    | OFF      | OFF      |
| IN 2    | ✓    | Low    | Low    | OFF      | OFF      |
| IN 3    | ✓    | Low    | Low    | OFF      | OFF      |
| IN 4    | ✓    | Low    | Low    | OFF      | OFF      |
| IN 5    | ✓    | Low    | Low    | GDC74 #1 | GDC74 #1 |
| IN 6    | ✓    | High   | High   | GRS77 #1 | GRS77 #1 |
| IN 7    | ✓    | Low    | Low    | OFF      | OFF      |
| IN 8    | ✓    | Low    | Low    | OFF      | OFF      |
| OUT 1   | ✓    | Low    | Low    | OFF      | OFF      |
| OUT 2   | ✓    | Low    | Low    | OFF      | OFF      |
| OUT 3   | ✓    | Low    | Low    | OFF      | OFF      |
| SDI     | ✓    | Common | Common |          |          |

SET > ACTV > SET CLR NV

**Figure 8-2. GIA1 RS-232/ARINC 429 Configuration Page**

11. Activate the cursor and select GIA2 in the SELECT UNIT field, then press the ENT key. GIA2 indications will be the same as presented in Figure 8-2.
12. Repeat Steps 9 and 10.

13. On the PFD, go to the RS-485 CONFIGURATION page in the GIA Page Group (labeled CAN / RS-485 CONFIGURATION for SW v0321.19 or earlier).
14. Verify that GIA1 is selected in the SELECT UNIT field.
15. Observe the data indicators for all configured RS-485 channels.
16. Verify all DATA indicators for configured channels are GREEN (green check), indicating the channels are receiving data as shown:

**RS-485 CONFIGURATION**

SELECT GIA UNIT: **GIA1**

**RS-485**

| CHANNEL | DATA | INPUT DATA |        | OUTPUT DATA |        |
|---------|------|------------|--------|-------------|--------|
|         |      | SET        | ACTIVE | SET         | ACTIVE |
| CHNL 1  | ✓    | GEA 1      | GEA 1  | GEA 1       | GEA 1  |
| CHNL 2  | ✗    | OFF        | OFF    | OFF         | OFF    |
| CHNL 3  | ✗    | OFF        | OFF    | OFF         | OFF    |
| CHNL 4  | ✓    | GFC700     | GFC700 | GFC700      | GFC700 |
| CHNL 5  | ✗    | OFF        | OFF    | OFF         | OFF    |

**LOCKED DATA INTERFACE**

| CHANNEL | INPUT/OUTPUT DATA     |
|---------|-----------------------|
| CHNL 1  | SET: OFF, ACTIVE: OFF |

SET>ACTV/ACTV>SET

**Figure 8-3. GIA1 RS-485 Configuration Page**

17. Activate the cursor and select GIA2 in the SELECT UNIT field, then press the ENT key. GIA2 indications will be the same as presented in Figure 8-3.
18. Repeat Steps 15 and 16.
19. Backup path testing is complete.

### 8.3 GFC 700 Ground Checkout

The following procedures verify the proper operation of the GFC 700 AFCS, after maintenance has been performed. The technician performing these checks should be thoroughly familiar with the G1000 and GFC 700 by studying the following references:

- G1000/DA40 Cockpit Reference Guide, Garmin P/N 190-00324-11
- Airplane Flight Manual Supplement: G1000 Integrated Avionics System with GFC 700 Automatic Flight Control System – Diamond Model DA40 & DA40F, Garmin P/N 190-00492-10

#### 8.3.1 Pre-Flight Test

1. Power down the G1000 system using the Avionics Master, then the BAT-side aircraft master switch. If a ground power unit is being used, it too must be powered off. Wait 30 seconds then restore power to the system. The GFC 700 will begin an automatic pre-flight test after AHRS and ADC parameters become valid.
2. Verify that a white 'PFT' annunciation is displayed on the PFD, as shown in Figure 8-4.



**Figure 8-4. Pre-Flight Test**

#### NOTE

A red AFCS ( AFCS ) annunciation may be displayed momentarily before PFT starts. This indicates that the Autopilot and Manual Electric Trim are not available (due to AHRS initialization, GFC 700 system failure, power loss, or because PFT has not been performed)

3. Upon successful completion of the test, an aural alert will sound and the annunciation will clear. For even-interval system power-up, the aural alert is generated by GIA 63 #1, whereas odd-interval system power-ups are generated GIA 63 #2.
4. Repeat Step 1 to test the PFT aural alert for the opposite GIA 63.
5. Continue to Section 8.3.2. (If the 'PFT' annunciation turns red, the test has failed).
6. If the aural alert is not heard, but pre-flight testing passed, engage the Autopilot by pressing the AP key and disengage the Autopilot by pressing the AP key again. Visual and aural disconnect alerting should occur. If no alert is heard, the audio interface between the GIA and audio panel should be checked.

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### 8.3.2 AFCS Switch Checks

To verify that the AFCS system buttons and switches are operating correctly, perform the following checks:

1. Actuate both halves of the manual electric pitch trim switch (MEPT). The trim clutch should engage and the trim wheel should drive in the requested direction. Check operation in both directions.
2. Press the AP DISC button and hold while actuating the MEPT switch. Trim should not run and the trim wheel should rotate freely when moved manually. Release the AP DISC button.
3. Engage the Autopilot by pressing the AP key on the MFD. Press and hold the left half of the MEPT switch. The Autopilot should disengage and the trim wheel should not move and rotate freely when moved manually.
4. Engage the Autopilot again by pressing the AP key on the MFD. The pitch and roll clutches should engage, resisting movement of the control stick. Press and hold the CWS switch. The control stick should now move freely when moved manually.
5. Release the CWS switch and press the AP DISC switch. The Autopilot should disengage with a flashing amber 'AP' annunciation on the PFD, accompanied by an aural alert. Verify that the control stick is free in pitch and roll axes.
6. Engage the Autopilot again by pressing the 'AP' key on the MFD. Pull the AFCS circuit breaker. The Autopilot should disengage, with abnormal disconnect alerting, consisting of a continuous disconnect tone and a flashing red/white 'AP' annunciation. No AFCS annunciations (e.g. AFCS, PFT, Mistrim) should remain on the PFD. Press the A/P DISC switch to cancel the abnormal alert. Reset the AFCS breaker and watch the pre-flight test sequence again.
7. Press the GA button, on the throttle lever. 'GA' should be annunciated on the PFD for both pitch and roll modes and the command bars should indicate a wings-level climb to 7 degrees.
8. Press the FD key on the MFD to deactivate the Go Around mode, and reset the Flight Director. Press the AP key to engage the Autopilot. Press the CWS button for a few seconds and release; verifying there is no residual force on the control stick for the pitch axis. Extend the flaps to approach position. The trim wheel should immediately run in the **DOWN** direction. Now retract the flaps. The trim should immediately run in the **UP** direction.
9. Disengage the Autopilot by pressing the AP DISC switch.
10. On the MFD use the ALT knob and set the altitude in the altitude preselect window to an altitude greater than the current field altitude.
11. Now engage VS mode by pressing the VS key on the MFD. Verify the PFD display 'VS' in green and indicates a pitch reference of '0' FPM.
12. Press the FLC key on the MFD and verify that 'FLC' is annunciated on the PFD in green with a reference of 70 KTS (NOTE: This is the minimum speed reference for the GFC 700).
13. Press the ALT key on the MFD and verify that the 'ALT' annunciation is displayed in green on the PFD with an altitude reference equal to the aircraft altitude (within the nearest 20 feet).
14. Press the FD key and verify that the mode annunciations and command bars are removed from the display.

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### 8.3.3 Autopilot Clutch Overpower Check

#### **NOTE**

The GFC 700 uses electronic torque limiting as well as mechanical slip clutches to limit the maximum servo effort. When the system is on the ground, the electronic torque limiting is removed, allowing manual checks of the slip-clutch settings.

1. Engage the Autopilot by pressing the AP key on the MFD.
2. Apply force to the control stick to determine if the Autopilot clutches can be overpowered in pitch and roll. If the Autopilot clutches cannot be overpowered, check the servo clutch torque settings.
3. Actuate the MEPT switch in the nose down position. This causes an Autopilot disconnect and the trim will run in the nose down direction.
4. While the trim is running, grasp the aircraft pitch trim wheel and verify that the trim clutch can be overpowered in both directions.
5. Actuate the MEPT switch in the nose up position. Run the trim in the nose up direction and verify the trim clutch can be overpowered in both directions.

#### **NOTE**

If the trim clutch cannot be overpowered, check the trim servo clutch torque setting. See Section 4.10

6. Verify also that the trim wheel moves smoothly in both directions throughout the entire trim range during MEPT switch operation.

#### **NOTE**

If the trim wheel hesitates, this may indicate that the pitch trim clutch is slipping. First verify proper clutch setting and cable tension. If both clutch setting and cable tension are within tolerance, check the aircraft pitch trim system for excessive friction.

### 8.3.4 Manual Electric Trim Speed Check

1. Run the manual electric trim in one direction until it runs against the stop.
2. Using a stop watch or equivalent device, time the trim speed from one end of travel to the opposite stop. The elapsed time should measure  $17 \pm 3$  seconds for each direction.

### 8.3.5 Autopilot Operation Checks

1. Engage the Autopilot by pressing the AP key on the MFD. Push the HDG knob in to synchronize the heading bug to the present aircraft heading on the HSI. Select Heading mode by pressing the HDG key on the MFD. The command bars should be level and the control stick should be stationary (very slow movement acceptable, due to the aircraft not being perfectly level).
2. Turn the HDG knob to the left and right and check that the command bars move in the correct direction and the control stick follows the command bars.
3. Push the CWS button and pull the control stick to the middle of the pitch control range. Release the CWS button. The Autopilot clutches should re-engage and hold the stick stationary.
4. Holding the control stick lightly, press the NOSE UP key on the MFD twice, to increase the pitch reference. The command bars should move up 1 degree and the control stick should begin moving aft. In some aircraft, the down spring may require manual assistance to get aft control stick movement.
5. Hold the control stick and press the CWS button, re-synchronizing the pitch reference and re-centering the control stick. Release the CWS button and check that servo clutches re-engage before releasing the control stick.

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6. Press the NOSE DN key on the MFD twice. The command bars should command down and the control stick should begin moving forward. Hold the controls and press CWS to re-center the command bars and stop control stick movement.
  7. With the Autopilot still engaged and the CWS button pressed, move the control stick to its aft limit. Release the CWS button and apply continuous forward pressure, slowly moving the control stick. After 1 or 2 seconds, the trim wheel should begin moving in a trim up direction.
  8. Grip the control stick and press the CWS button. Trim motion should stop. Move the control stick to the forward limit and release the CWS button. Now slowly pull back on the control stick. After a similar delay, the trim wheel should begin to trim down. Relief pressure on the wheel and the trim motion should stop. Check that the trim wheel is free to turn. Hold the control stick and press the AP DISC switch to disconnect the Autopilot.

## **8.4 Maintenance Records**

After conducting required return-to-service procedures in accordance with the Diamond DA 40 Airplane Maintenance Manual, the aircraft may be returned to service.

Record the following information in appropriate aircraft maintenance logs:

- Part number of the G1000 software loader card used to perform software loading or software updates.
- Record part and serial numbers of any LRU which was replaced.
- Record any database updates which were performed during maintenance.
- Any other applicable information related to the maintenance work performed on the aircraft.

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